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ABSTRACT

The 1972-73 annotated bibliography of the Wisconsin Research and Development Center for Cognitive Learning is arranged by revised program components and completed projects in numerical order. Entries deal with learning strategies, child development, elementary math and science, reading skills, computer applications, individualized systems, and disadvantaged youth, among other topics. Within each component or project, the research publications are alphabetically listed by author with working papers grouped separately in the same manner. An author index is included. (Author/KM)

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PUBLICATIONS

OF THE

WISCONSIN RESEARCH AND DEVELOPMENT CENTER

FOR COGNITIVE LEARNING

Herbert J. Klausmeier, Director

TM 002 806

The University of Wisconsin
Madison, Wisconsin

September 1972

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PREFACE

The 1972 R & D Center bibliography is arranged by revised program components and completed projects in numerical order. Within each component or project, the research publications are alphabetically listed by author with working papers grouped separately in the same manner. An author index is included on page 139, and a chronological listing of publications by classification (technical report, theoretical paper, practical paper, working paper) is available on request.

Technical reports and theoretical papers are available to the public in limited numbers unless specified out of print. Working papers are frequently obtainable, but are printed in small quantities for in-house use and narrow distribution; this is the case for technical memos, also. Curriculum-oriented practical papers receive widest distribution.

Copies of any Center publications that are out of print may be purchased from the U.S. Office of Education Educational Resources Information Center (ERIC). Bibliography references that have been indexed by ERIC are followed by ERIC Document (ED) numbers. Current handling charges and ordering details may be obtained from the abstract journal Research in Education or from the U.S. Government Printing Office.

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Research Components

Component R1
Children's Learning and Development

Cognitive Operations and Abilities in Concept Learning

Children's Cognitive Development and Concept Learning

Motivation-Attention Processes in Learning and Retention

Modes of Cognitive Representation

Principal Investigators:
Herbert J. Klausmeier, Department of Educational Psychology
Frank H. Hooper, Department of Home Management and Family Living
Frank H. Farley, Department of Educational Psychology
Joel R. Levin, Department of Educational Psychology
Larry M. Wilder, Department of Communication Arts

Assistant Scientist:
Linda Ingison

Research Scholars:
Dorothy A. Frayer, Hofstra University
Elizabeth S. Ghatala, Weber State University

TECHNICAL REPORTS; THEORETICAL & PRACTICAL PAPERS; BOOKS

Adams, J. F. Learning to learn on a concept attainment task as a function of age and socioeconomic level. Technical Report No. 141. 42 pp. September 1970. ED 046 505.

The purpose of the study was to test the hypothesis that a learning to learn situation can identify true population differences between socioeconomic status groups.

The task used in the study was a concept attainment task, and the subjects were 7-, 9- and 11-year-olds from low and middle socioeconomic levels. It was expected that the low socioeconomic subjects and 9- and 11-year olds would have learning curves of increasing gains on the early problems, whereas the other subjects would have learning curves of decreasing gains.

In summary, the learning curves on all problems showed decreasing gains for both low and middle socioeconomic status children at the ages studied.

Anandalakshmy, S. Effects of instructional intervention on performance of second grade children in a categorization game. Technical Report No. 108. (Ph.D. dissertation) 75 pp. January 1970. ED 036 860.

Originating from an interest in the language-cognition relationship as reflected in the cognitive abilities of children, this study was planned to examine the differing theoretical implications of Piaget and Vygotsky regarding categorization.

Bourne, L. E., Jr. Concept learning and thought. Occasional Paper No. 7. 16 pp. January 1967.

This paper outlines the need for an explanation of behavior to account for its obvious generative and recursive character. The place of thinking as a concept in psychology is discussed.

Bourne, L. E., Jr. With discussion by Thomas A. Romberg and Dorothy A. Frayer. Development of conceptual skills: Some preliminary findings. Technical Report No. 81. 18 pp. March 1969. ED 035 953.

A series of exploratory studies and three experiments dealing with conceptual role learning are reported in this paper. Discussants related the results to subject matter field and to educational research and development.

Bourne, L. E., Jr., Dodd, D. H., Guy, D. E., & Justesen, D. R. Response-contingent postfeedback intervals in concept identification. Technical Report No. 18. 11 pp. February 1967. ED 013 980.

This paper was written during the summer of 1966 while the first author was a visiting scholar at the Center; the data were gathered prior to the summer. Two highly significant theoretical positions in the psychology of learning—incremental learning and all or none—are dealt with in the research reported.

Citron, M. The effect of multimedia presentation on the inducement of synthetic concepts: Technical Report No. 216. (Master's thesis) 50 pp. March 1972.

The purpose of this study was to determine if a multimedia presentation facilitates synthetic responses. The variables, linearity and meaningfulness of the presentation, were studied using a 2 X 2 design with outside control. The five conditions were administered to 95 fifth graders.

The synthetic responses were measured with three tasks. Task I consisted of a Similarities Judgment task, Task II was a Sorting task, and Task III consisted of a questionnaire about the presentation.

An ANOVA performed on the data from the Similarity Judgment and Sorting tasks showed no significance. A chi-square performed on the questionnaire did show significance on some questions, but these results were too isolated to accurately interpret. Descriptive analysis of the data, however, showed slight trends which would suggest that a multimedia format does facilitate synthetic responses.

Davis, J. K. Concept identification as a function of cognitive style, complexity, and training procedures. Technical Report No. 32. (Ph.D. dissertation) 28 pp. October 1967. (Out of print) ED 024 167.

In two experiments the influence of cognitive style in concept identification was studied. Three levels of complexity were used in the first experiment; four training conditions in the second.

Farley, F. H. Memory storage in free learning as a function of arousal and time with homogeneous and heterogeneous lists. Technical Report No. 87. 8 pp. June 1969. ED 035 957.

The relation of arousal to retention in free learning was studied. Contrary to previous paired-associate studies, no significant interaction between arousal condition and retention interval was obtained, nor was reminiscence detected. The high-arousal material demonstrated greater resistance to forgetting than the low-arousal material.

Farley, F. H., & Eischens, R. R. Children's processing of prose: The effects of question arousal, text complexity, and learner strata on long- and short-term retention. Technical Report No. 201. 11 pp. January 1972.

Evidence has accumulated indicating that high arousal or activation facilitates long-term retention (LTR) but depresses short-term retention (STR) relative to low activation in list learning. The present study extended this research to the learning and retention of text by children. It specifically investigated the effects of questions inserted into two passages of prose material on STR and LTR.

An ANOVA and post-hoc pair-wise comparisons revealed the group answering questions in both passages scored significantly higher on both STR and LTR than controls, indicating a facilitative effect of adjunct questions. A text complexity and learner strata interaction was suggested.

Farley, F. H., & Manske, M. E. The relationship of individual differences in the orienting response to complex learning in kindergartners. Technical Report No. 132. 9 pp. July 1970. ED 046 544.

The present study investigated an assumption that individual differences in magnitude of the orienting response (OR) to a non-signal tone, measured by heart-rate (HR) deceleration, is predictive of performance in a highly unrelated learning situation. The study employed kindergarten-aged subjects of both sexes classified into High, Medium, and Low Orienting Response categories.

It was concluded that this method holds promise where learning is concerned as an exceedingly early non-verbal predictor that should be free of race and social class influences.

Fredrick, W. C. Information processing and concept learning at Grades 6, 8, and 10 as a function of cognitive style. Technical Report No. 44. 51 pp. March 1968. ED 024 059.

This research furthers our understanding of the relationship between an organismic factor, "cognitive style," and performance on concept learning and information processing tasks. Results showed that not only do "high analytical" type students perform better on this experimental task, but they also do better in certain school subjects.

Ghatala, E. S. Encoding verbal units in memory: Changes in memory attributes as a function of age, instructions, and retention interval. Technical Report No. 134. (Ph.D. dissertation) 83 pp. June 1970. ED 043 084.

Recognition errors of children in Grades 2, 4, and 6 were examined. Ss learned words under intentional or incidental instructions and were tested immediately or 48 hours later. Ss had to choose a target word from among acoustic, conceptual, associative, and neutral distractors.

Instructions had little effect on types of errors. Over the interval, acoustic errors decreased relative to the other error types. Developmental changes in memory attributes and differential forgetting of attributes were inferred.

Ghatala, E. S. Memory attributes: Some directions for further research and implications for education. Theoretical Paper No. 27. 16 pp. December 1970. ED 046 038.

The conceptualization of memory as consisting of a collection of attributes was explored. Underwood's (1969) work on attributes of memory was reviewed. Following this, several paradigms for further research were suggested. One research paradigm dealt with individual differences and memory attributes. It was suggested that individuals may differ in the extent to which they develop or utilize certain types of attributes. A second research paradigm dealt with the types of organization imposed by a subject during the learning of a list of verbal items.

Finally, some selected research on second-order storage and retrieval plans was reviewed. Implications of research on memory attributes for education were discussed.

Ghatala, E. S. Research on variables and processes in cognitive learning of environmental content: Needs and specifications. Working Paper No. 82. 31 pp. December 1971.

The research program described in this paper is an attempt to apply the integrated fundamental research efforts of the Center to a specific area of the elementary school curriculum, environmental education. The goals of the research program are to provide: (a) new knowledge about the interrelation of process, learning variables, and individual differences which will have implications for cognitive theory, and (b) new information concerning conditions of cognitive learning which can be applied to the development of sound instructional materials and procedures. A research model or framework which specifies the variables and processes of interest was developed. The present paper has not resulted in the establishment of a new research activity within Program 1 of the Center. Rather, it has provided a basis for reorganization of Program 1 so that the goal of integrating research on processes, learning variables, and individual differences could be achieved without the addition of a special "integrative" research activity.

Ghatala, E. S., & Hurlbut, N. L. Effectiveness of acoustic and conceptual retrieval cues in memory for words at two grade levels. Technical Report No. 220. 9 pp. March 1972.

The effectiveness of two types of retrieval cues was assessed with second- and sixth-grade children. After a single presentation of a list of words, the children first recalled as many of the words as they could. Following free recall, children in each grade were given either conceptual (category names for words on the input list) or acoustic (words which rhymed with words on the list) retrieval cues for the words missed in free recall. For all Ss conceptual cues were more effective than acoustic cues. For sixth-grade Ss both types of cues were more effective than could be expected on the basis of guessing. Second graders performed less well than sixth graders with both types of cues. While conceptual cues produced above-chance performance at the second-grade level, acoustic cues did not. Results are discussed in terms of developmental changes in memory attributes.

Golub, L. S., Fredrick, W. C., & Harris, M. L. Measuring language arts concept attainment: Boys and girls. Technical Report No. 199. 25 pp. November 1971.

Test development efforts for constructing 12 items to measure achievement of each of 30 selected language arts concepts are described. Item and total score statistics for data collected on 186 boys and 259 girls who had just begun the sixth grade are presented and discussed.

Harris, M. L., & Golub, L. S. An analysis of content and task dimensions of language arts items designed to measure level of concept attainment. Technical Report No. 200. 37 pp. November 1971.

Content and task dimensions of language arts items were studied using factor analytic techniques. These items were developed to measure concept attainment using a completely crossed design with 30 concepts and 12 tasks. Conventional factor analyses were performed, separately for boys and girls, for concept scores and for task scores. Three-mode factor analyses were performed.

The main conclusions drawn from the results of the conventional factor analyses are that all 30 of the concepts are measures of a single functional relationship existing among the concepts, and that all 12 tasks are measures of a single underlying ability or latent trait. The three-mode results indicate that there are no important concept-task interactions for the idealized persons; thus it is reasonable to regard the concepts and the tasks as being two independent modes.

Harris, M. L., & Harris, C. W. Item analyses and reliabilities for reference tests for cognitive abilities: Fifth grade boys and girls. Technical Report No. 191. 23 pp. November 1971.

Test development efforts for constructing 35 of the tests included in a battery of 56 tests of possible cognitive abilities are described. Data were collected on 172 boys and 210 girls who had just completed the fifth grade. Item and total score statistics obtained for the 56 tests in the total battery are presented and discussed.

Harris, M. L., & Harris, C. W. Analysis of dimensions of a battery of reference tests for cognitive abilities: Fifth grade boys and girls. Technical Report No. 192. 94 pp. November 1971.

Three systems for defining general cognitive abilities were analyzed to determine the nature of possible reference tests for cognitive abilities. They are the Guilford analysis of cognition, Guttman's facet design, and the Primary Mental Abilities of the Thurstones. This analysis led to a fourth schema for classifying abilities that deal with cognizing concepts.

A battery of 56 tests was developed to study the relationships among the four schemata. Data for the 56 tests were collected on 172 boys and 210 girls who had just completed the fifth grade.

Six sets of derived factors, three orthogonal and three oblique, were interpreted. Six clear comparable common factors and one that is fairly clear were obtained for boys. The six clear comparable common factors appear to represent most closely six of the seven Primary Mental Abilities. The comparable common factor that is fairly clear may be a missing Primary Mental Ability--Spatial Ability. Five clear comparable common factors obtained for girls appear to be five of the seven Primary Mental Abilities.

Harris, M. L., & Harris, C. W. Three systems of classifying cognitive abilities as bases for reference tests. Theoretical Paper No. 33. 33 pp. November 1971.

Three systems for defining cognitive abilities, proposed by Guilford, Guttman, and the Thurstones, are examined as bases for specifying reference tests for cognitive abilities. The authors propose the cognition of concepts system as a fourth alternative. Tests constructed and/or adapted on the basis of this examination are described.

Harris, M. L., & Romberg, T. A. Measuring mathematics concept attainment: Boys and girls. Technical Report No. 195. 29 pp. November 1971.

Test development efforts for constructing 12 items to measure achievement of each of 30 selected mathematics concepts are described. Item and total score statistics for data collected on 196 girls who had just completed the fifth grade during early summer of 1970 and 195 boys who had just begun the sixth grade during the fall of 1970 are presented and discussed.

Harris, M. L., & Romberg, T. A. An analysis of content and task dimensions of mathematics items designed to measure level of concept attainment. Technical Report No. 196. 39 pp. November 1971.

Content and task dimensions of mathematics items were studied using factor analytic techniques. These items were developed to measure concept attainment using a completely crossed design with 30 concepts and 12 tasks. Conventional factor analyses were performed, separately for boys and girls, for concept scores and for task scores. Three-mode factor analyses were performed.

The main conclusions drawn from the results of the conventional factor analyses are that all 30 of the concepts are measures of a single functional relationship existing among the concepts, and that all 12 tasks are measures of a single underlying ability or latent trait. The three-mode results indicate that there are no important concept-task interactions for the idealized persons; thus it is reasonable to regard the concepts and the tasks as being two independent modes.

Harris, M. L., & Tabachnick, B. R. Measuring social studies concept attainment: Boys and girls. Technical Report No. 193. 31 pp. November 1971.

Test development efforts for constructing 12 items to measure achievement of each of 30 selected social studies concepts are described. Item and total score statistics for data collected on 196 girls who had just completed the fifth grade and 195 boys who had just begun the sixth grade are presented and discussed.

Harris, M. L., Tabachnick, B. R, & Huysamen, G. An analysis of content and task dimensions of social studies items designed to measure level of concept attainment. Technical Report No. 194. 43 pp. November 1971.

Content and task dimensions of social studies items were studied using factor analytic techniques. These items were developed to measure concept attainment using a completely crossed design with 30 concepts and 12 tasks. Conventional factor analyses were performed, separately for boys and girls, for concept scores and for task scores. Three-mode factor analyses were performed.

The main conclusions drawn from the results of the conventional factor analyses are that all 30 of the concepts are measures of a single functional relationship existing among the concepts, and that all 12 tasks are measures of a single underlying ability or latent trait. The three-mode results indicate that there are no important concept-task interactions for the idealized persons; thus it is reasonable to regard the concepts and the tasks as being two independent modes.

Harris, M. L., & Voelker, A. M. An analysis of content and task dimensions of science items designed to measure level of concept attainment. Technical Report No. 198. 29 pp. November 1971.

Content and task dimensions of science items were studied using factor analytic techniques. These items were developed to measure concept attainment using a completely crossed design with 30 concepts and 12 tasks. Conventional factor analyses were performed, separately for boys and girls, for concept scores and for task scores. Three-mode factor analyses were performed.

The main conclusions drawn from the results of the conventional factor analyses are that all 30 of the concepts are measures of a single functional relationship existing among the concepts, and that all 12 tasks are measures of a single underlying ability or latent trait. The three-mode results indicate that there are no important concept-task interactions for the idealized persons, thus it is reasonable to regard the concepts and the tasks as being two independent modes.

Haveman, J. E., & Farley, F. H. Arousal and retention in paired-associate, serial, and free learning. Technical Report No. 91. 18 pp. July 1969. (Out of print) ED 035 959.

In an effort to investigate the relationships of arousal and long-term recall, arousal was manipulated by white noise during paired-associate, serial, and free learning in three experiments. The results suggested that the effects of arousal are dependent on the nature of the material to be processed and the intensity of arousal.

Hawkins, P. D. Hypostatization of selected environmental concepts in elementary school children. Technical Report No. 215. (Master's thesis) 61 pp. March 1972.

The present investigation studied the effectiveness of implicit analogies as advance organizers in children's learning. It was hypothesized that analogies which were structurally isomorphic to the target concept would facilitate learning of the latter even though linkages between components of the two concepts were not overtly specified.

Ninety-six sixth graders from a rural Wisconsin middle school served as subjects. Subjects in the experimental condition initially read an advance organizer describing an occupational hierarchy which was structurally isomorphic to the ecological hierarchy described in the experimental passage. One control condition received an irrelevant advance organizer containing significant terms from the job description embedded in a story. The second control condition received no advance organizer.

Results of the study showed no significant effects of the advance organizer. Interpretation remains unclear, however, since a number of confounding factors may have been involved and several alternative explanations are plausible.

Horvitz, J. M. The use of imagery instructions in children's learning as a function of age. Technical Report No. 159. (Master's thesis) 66 pp. April 1971.

The present study was an attempt to investigate concurrently the usefulness of imagery instructions in learning PA nouns embedded in sentences and conjunction phrases with three different age groups, third grade, sixth grade, and college students. In addition, six different item types were employed in order to convey increasingly dissimilar contexts from study to test trials.

It was concluded that imagery is a useful mediator for sixth graders and above, while third graders are too developmentally immature to utilize self-generated imagery; semantic factors in learning are important, but imagery instructions used effectively may facilitate learning regardless of the semantic context involved.

Houston, T. R., Jr. Comparable common factors in English homophone recognition. Technical Report No. 163. (Ph.D. dissertation) 168 pp. March 1971.

A list of 7,300 English homophones was compiled and used to construct two tests. Scores were obtained on these and on reference tests for J. P. Guilford's factors CMU, CSU, DMU, DSU for 70 native speakers of midwestern American English from a university population. The homophone tests showed Hoyt reliabilities of .95 and .87 for these subjects.

Following Harris's procedure for determining Comparable Common Factors, a 15 x 15 matrix of intercorrelations was subjected to three factoring procedures, each yielding oblique and orthogonal solutions. Results were in close agreement for all analyses, yielding three common factors. Two corresponded to CMU and to DMU. The CSU and DSU tests loaded on the third factor, which had its largest loading on the homophone tests, and involved comparing verbal stimuli with formal elements of internally generated lists. These findings replicate Harris's failure to extract distinct CSU and DSU factors, and suggest that homophone recognition tasks can provide short but reliable reference tests for the symbolic factor into which CSU and DSU coalesce.

Jones, D. L. Relationships between concept learning and selected ability test variables for an adult population. Technical Report No. 51. 57 pp. May 1968. (Out of print) ED 024 331.

A verbal concept-learning task suitable for college students was devised which permitted the externalizing and quantifying of behavior at six points in the learning process. The learning task and 16 nonarbitrarily selected ability tests purporting to measure reasoning, memory, and verbal factors were administered to 102 college females.

Jones, M. E., & Farley, F. H. Short- and long-term retention as a function of variations in stimulus and response interestingness. Technical Report No. 150. 19 pp. December 1970. ED 046 032.

The purpose of this study was to investigate the effect of interestingness as a variable in paired-associate learning and retention. A pilot study with 45 subjects was used to construct paired-associate lists of three levels of interestingness (high, middle, low) and controls over associative properties of stimulus and response terms. In the main study, subjects were randomly assigned to the nine different lists and to short- vs. long-term retention intervals.

A significant interaction between interest and short- vs. long-term retention was not obtained.

Kalish, P. W. Concept attainment as a function of monetary incentives, competition, and instructions. Technical Report No. 8. (Master's thesis) 16 pp. September 1966. ED 010 510.

The three main purposes of the reported study were to compare the effects on concept-attainment behavior of optimal and minimal instructions, two levels of monetary incentives, and high and low competition. Error scores on a classification test for each concept were used in the analysis.

Kaplan, S. A. Elaboration and reading achievement as factors in children's learning of text materials. Technical Report No. 180. (Master's thesis) 41 pp. September 1971.

The purpose of this experiment was to investigate sentence facilitation of paired-associate learning using connected text rather than the unrelated, simple sentences of previous research. Each of 64 fifth graders, classified as either a High or Low reading achiever, was assigned to one of four presentation conditions: hear sentences/read sentences with instructions to learn about the story, hear sentences/read sentences with instructions to learn the pairs of underlined words, hear sentences/read pairs, and hear pairs/read pairs. This study replicated other recent experiments which have failed to find sentential facilitation of PA learning when the sentences are both heard and read. For the High readers, learning was facilitated when the sentences were heard but only the pairs were read, while the Low readers performed better when both elaboration and instructions to learn the pairs were given than in the conditions where either elaboration or instructions was missing. The results of this study demonstrated the importance of achievement level to PA learning and suggested the application of elaboration research findings to school learning.

Kumar, K., & Farley, F. H. Influence of temporal parameters and intensity of post-learning arousal change on long-term retention. Technical Report No. 160. 23 pp. April 1971. ED 051 538.

The present study was designed to examine the effects on long-term retention of variations in intensity and temporal parameters of arousal following a single learning trial in a paired-associate task. The Ss were 56 female university students.

Intensity of arousal was manipulated by using two levels of white auditory noise, viz., 75 db. and 90 db., and a condition without white noise. Noise was delivered to the Ss through earphones at three different temporal intervals, viz., 0-3 min., 3-6 min., and 6-9 min., following a learning trial.

The main effect of level of arousal was not significant. As regards temporal intervals, it was found that 75 db. of white noise delivered between 6-9 min. had significantly higher recall when compared with a combined mean of all the other conditions ($p < .02$). Individual contrasts with each group mean revealed that the 75 db., 6-9 min. group was not significantly different from the no-noise group and the 0-3 min. groups at both levels of noise. The recall scores were lowest for 3-6 min. groups at both levels of noise, significantly less than the 75 db., 6-9 min., but not significantly different from the no-noise group. The results were discussed in terms of a multi-stage analysis of memory consolidation and directions for further research were outlined.

Lemke, E. A., Klausmeier, H. J., & Harris, C. W. The relationship of selected cognitive abilities to concept attainment and information processing. Technical Report No. 11. 17 pp. October 1966. ED 010 513.

The effects of eight convergent cognitive abilities on concept attainment behavior were studied under selection and reception learning conditions. Thirty-four task and ability variables were intercorrelated, then analyzed using Alpha techniques.

Levin, J. R., Ghatala, E. S., Wilder, L., & Inzer, E. Imagery and vocalization strategies in children's verbal discrimination learning. Technical Report No. 221. 9 pp. April 1972.

The verbal discrimination learning of elementary school children was assessed in two experiments. In both experiments, Ss were given either regular discrimination learning instructions (control), instructions to pronounce the correct pair member aloud three times during study trials (vocalization), or instructions to generate a visual image of the correct pair member during study trials (imagery). Experiment 1 employed a mixed list of homonym, synonym, and unrelated noun pairs. The results of the two experiments provided partial support for the proposition that a particular rehearsal strategy would be facilitative only when it provided a discriminative cue which was relevant to the materials on hand.

Levin, J. R., Wolff, P., Davidson, R. E., & Rohwer, W. D., Jr. Issues in imagery and learning: Four papers. Theoretical Paper No. 36. 44 pp. February 1972.

The papers included here are based on a 1971 symposium held at the annual meeting of the Western Psychological Association in San Francisco. The first three papers report the results of research carried out over the last few years at the Wisconsin Research and Development Center for Cognitive Learning. Levin's paper focuses on the effectiveness of verbal and imaginal cognitive strategies, and their development with age. Surprisingly, the age variable represents a relatively recent consideration in experiments in which subjects are required to generate their own dynamic visual representations. Wolff's paper summarizes research in which the developmental course of imagery production is tied to the early sensorimotor activity of the young child. Davidson examines another theoretical issue: the relationship between imagery and language processes in the child, and the broader question of whether imagery is inextricably linked to meaning. Rohwer's paper deals with a recurring theme in imagery research, namely the difficult-to-determine task and population validities for supposedly easy-to-demonstrate phenomena. He documents the fact that well-established findings based on one set of operations may not be extended easily to tasks involving different materials or to demographically different populations.

Lovejoy, M. A., & Farley F. H. The relationship of arousal during learning to short- and long-term retention employing two indices of arousal. Technical Report No. 184. 20 pp. November 1971.

This experiment tested the hypothesis that paired-associate learning accompanied by high arousal should lead to stronger permanent memory and weaker immediate memory than paired-associate learning accompanied by low arousal. During continuous recording of skin resistance and heart rate as measures of arousal, 32 Ss were given a one-trial, eight-item paired-associate task consisting of 0% association value nonsense syllables as stimulus terms and the digits 2 to 9 as response terms. The Ss were tested for recall following either a 2.87-min. or 24-hr. interval. When skin resistance was used as a measure of arousal, the results confirmed the hypothesis. There was a significant interaction between arousal level and time of recall under conditions of high- and low-arousal as defined by amount of galvanic skin response deflection. Retention for material learned under low arousal decreased rapidly over 24 hours. High-arousal learning, on the other hand, showed a marked reminiscence effect. Arousal level as defined by heart rate, however, showed no significant effects on retention.

The manipulation of arousal was undertaken through the use of 75 db. white noise as had been done in previous experiments. The present research failed to show any significant effects of white noise during learning on either recall or physiological measures.

Lynch, D. O. Concept identification as a function of instructions, labels, sequence, concept type, and test item type. Technical Report No. 6. (Master's thesis) 16 pp. June 1966. (Out of print) ED 010 212.

The effects of instructions and three stimulus variables—type of label, type of concept, and sequence of concepts by type—are investigated in the described study. Performance was analyzed in terms of four types of test items.

Manske, M. E., & Farley, F. H. Individual differences in the orienting response and arousal as factors in the short- and long-term retention of children in grades K-4. Technical Report No. 161. 20 pp. June 1971.

The present experiment investigated the assumptions that (1) individual differences in the orienting response (OR) as measured by heart rate deceleration to a non-signal tone, can be used to predict retention in a pictorial paired-associate task; and (2) that arousal level during learning, as assessed by either heart rate or blood volume changes, interacts with short- and long-term memory. Specifically, it tested the hypothesis that learning under conditions of high arousal should lead to stronger permanent memory and weaker immediate memory than learning under conditions of low arousal. When digital vasoconstriction was used as the measure of arousal, the results confirmed the hypothesis.

Learning under high and low arousal defined by digital vasoconstriction revealed a significant interaction ($p < .05$) between arousal level and time of recall. At immediate retention, low-arousal learning was superior to high-arousal learning but at long-term retention this relationship was reversed. However, arousal level as defined by heart rate change showed no significant interaction with retention.

Orienting response level showed a complex interaction with recall interval, sex, and grade ($p < .05$). Although most groups showed classical forgetting over 24 hours, second-grade Medium Orienting males and fourth-grade High Orienting males and Medium Orienting females demonstrated marked resistance to forgetting.

Miller, G. W., & Davis, J. K. Retention and concept identification as functions of concept complexity, method of presentation, stimulus exposure time, and conditions of recall. Technical Report No. 54. 44 pp. May 1968.

Three laboratory experiments were performed with college students to investigate concept identification and recall of information as a function of four selected variables: concept complexity, method of instance presentation, stimulus exposure time, and conditions of recall.

Mizelle, R. M., & Farley, F. H. Learning as a function of stimulus and response arousal with control over meaningfulness, imagery, and concreteness. Technical Report No. 165. 15 pp. June 1971.

The contribution to learning of the learning materials' arousal properties was investigated using degree of interest of the stimulus and response terms as the index of arousal. Words equated on meaningfulness, imagery, and concreteness and rated as high, medium, and low in interest were used to represent the three levels of interest, and served as stimulus and response terms. Ninety students were randomly assigned to one of the nine treatment conditions consisting of variations in interest on the stimulus and response side.

The results revealed no significant difference between groups or within groups. The planned comparison suggested that the greatest amount of learning occurred in medium levels of response interest. However, high, medium, and low response effects were not significantly different from each other at conventional levels. The inverted U suggested in this study is in line with certain previous research.

Nelson, G. K. A study of classificatory behavior in low socioeconomic status children of varying characteristics. Technical Report No. 181. (Master's thesis) 120 pp. October 1971.

The purpose of this study was to determine the relationship of method of presentation, grade level, sex, and achievement within grade and sex to the various bases upon which children of low socioeconomic background classify geometric concepts. Two tasks were administered to 96 subjects in the fifth, eighth, and eleventh grades—32 at each grade level. Task I was an equivalence task comprised of a sequential presentation of eight geometric concept cards. Half the Ss were given a verbal presentation while the other half were given a pictorial presentation. Ss were asked to explain likenesses and differences between stimuli. Task II was a free sorting exercise. Ss were presented with a 26-item picture array, asked to select from the array cards which were alike, and to explain the bases of their groupings. Task I responses were classified into Perceptible, Attribute, Nominal, and Subject-Fiat categories; for Task II responses, only Perceptible, Attribute, and Nominal categories were used.

This study found, contrary to expectation, that low SES children in grades five, eight, and eleven do not vary significantly from one another in their bases of classifying geometric figures. Achievement, method of presentation, and sex were also found not to be a significant influence on bases of classification.

Nelson, G. K. Concept formation and the development of language. Theoretical Paper No. 37. 19 pp. May 1972.

This paper examines possible interchanges between cognitive and language processes with particular attention given to concept formation and semantic language development. Aspects of psychological and contemporary linguistic theories are discussed as a way to interrelate the functions of thought and language. It is concluded that semantic growth is largely a matter of verbal concept learning.

Osborne, J. W., & Farley, F. H. Individual differences in arousal and their relationship to short- and long-term retention. Technical Report No. 139. 26 pp. March 1971. ED 049 512.

In two separate paired-associate learning experiments each employing 40 university students as Ss, the contribution of individual differences (IDs) in arousal to short- and long-term retention was investigated using IDs in salivary response to lemon juice stimulation as an index of arousal. Experimental Ss were pre-selected out of 184 Ss on the basis of extreme arousal scores.

The hypotheses were tested that high-arousal learning would lead to poor short-term retention but would demonstrate reminiscence or superior long-term retention relative to low-arousal learning; low-arousal learning was expected to lead to superior short-term retention but classical forgetting over the long term relative to high-arousal learning.

Experiment (Exp.) One yielded (non-significant) results in the predicted direction, whereas Exp. Two, incorporating procedural changes on the basis of Exp. One, confirmed the hypotheses ($p < .025$).

Severson, H. H., & Farley, F. H. The identification of individual differences in the strength of the nervous system. Technical Report No. 162. 20 pp. April 1971.

This study attempted to investigate the hypotheses set forth by Russian researchers that there may be identified a pervasive characteristic of the central nervous system labeled as "strength." Ten of the 12 measures used in the study were direct replications of representative strength measures derived from the Russian work. Two additional measures were included to test the possible relationship between strength and "arousal."

The study employed 33 graduate students as Ss. The measures used included Absolute Visual Threshold, Auditory Threshold, 2-Flash Threshold, and Reaction Time, with the remaining variables derived by systematically varying experimental conditions.

A factor analysis provided no clear-cut support for a dimension of strength although a number of less pervasive factors were obtained. Discriminate function and regression analyses supported this general conclusion. The discussion centered around methodological issues and an apparent dimension of arousal.

Voelker, A. M., & Harris, M. L. Measuring science concept attainment of elementary school boys and girls. Technical Report No. 197. 29 pp. November 1971.

The procedures employed in constructing and revising 12-item tests of concept attainment for 30 selected science concepts are described. The total score and individual item statistics for data collected on a group of beginning sixth-grade children are presented and discussed. Separate data analyses are presented for the boys and the girls.

Wilder, L. Analysis training: Failure to replicate Elkonin. Technical Report No. 202. 13 pp. January 1972.

This experiment was an attempt to replicate a sound-discrimination training procedure reported by Elkonin (1963). Eight kindergarten Ss were given a training list composed of five words made up of nine sounds. Experimental Ss learned to discriminate the sounds making up the words with the aid of pictures representing the words as well as tokens to represent the sounds. Control Ss did not receive picture and token training.

There were no significant differences between the experimental and control Ss on training or transfer lists. This failure to replicate was discussed in terms of age of Ss, possible differences between American and Soviet children, and time spent during training. It was suggested that future research should focus on younger children.

Wiviott, S. P. Bases of classification of geometric concepts used by children of varying characteristics. Technical Report No. 143. (Ph.D. dissertation) 137 pp. in 2 vols. August 1970. ED 046 049 No. 1. ED 046 050 No. 2.

The purpose of this experiment was to ascertain the relationship of grade level, achievement level, sex, and method of presentation to the various bases by which children classify geometric concepts. Two tasks were administered consecutively to subjects in the fifth, eighth, and eleventh grades. Task I consisted of the sequential presentation of an array of eight geometric concept cards. Half of the subjects had a verbal treatment and the other half a pictorial treatment. Task II consisted of a simultaneous presentation of a 26-item picture array of the same concepts. The subjects were asked to compare and group similar concepts and their responses were categorized according to three bases of classification: perceptible, attribute, and nominal. Results showed less use of the perceptible basis of classification with increase in grade level, with high achievers at all grade levels, and with those subjects who received verbal treatment for Task I.

Wolff, P., & Levin, J. R. The role of overt activity in children's imagery production. Technical Report No. 204. 10 pp. January 1972.

The role of motor activity in children's formation of dynamic mental imagery was investigated in two experiments using a paired-associate recognition task. From the recognition data it was inferred that (a) the child's ability to form dynamic images relating two objects undergoes its most rapid development between the ages of five and eight; and (b) the preimagery child can generate dynamic mental imagery in which two objects interact if he concurrently engages in overt manipulation of the objects. This is true even when the child has no visual access to his movements or to the objects being manipulated. These results offer strong support for Piaget's theoretical ideas concerning the role of overt and covert activity in the production of mental imagery.

Wolff, P., Levin, J. R., & Longobardi, E. T. Motoric mediation in children's paired-associate learning: Effects of visual and tactual contact. Technical Report No. 205. 9 pp. February 1972.

The generation of dynamic mental imagery is known to facilitate paired-associate (PA) learning in older subjects. Wolff and Levin (1972) have reported that children who were apparently too young to generate mental imagery of this kind did benefit from self-generated motoric interactions involving pairs of toys. Since the result was obtained whether or not the child could see the objects he was manipulating, it was interpreted as supporting Piaget's contention that imagery production in the pre-imagery child requires the internalization of motor actions. In the present study, we examined the child's ability to generate memory-enhancing interactions between object pairs when either visual contact with the objects, tactual contact, or both were absent. The PA performance of each of these activity groups (Visual-Tactual, Visual-No Tactual, No Visual-Tactual, and No Visual-No Tactual) was compared with corresponding control groups which received imagery instructions, but had no opportunity to manipulate the object pairs. Rated quality of overt manipulation was lowered by the absence of tactual contact with the objects, but not by the absence of visual contact. Quality of manipulation was positively related to amount of facilitation of PA performance. These results support the involvement of overt activity in the young child's imagery production and learning, and also demonstrate the kindergarten child's inability to produce ongoing thematic activity when this activity is physically separated from the objects involved.

Wolff, P., & Wilder, L. Visual and auditory memory in children. Technical Report No. 155. 11 pp. March 1971. ED 050 424.

Three studies investigated the effects of experimenter-produced labels on children's serial position memory. As in previous research with subject-produced labels, addition of the label facilitated performance only for the recency portion of the list. This effect did not vary systematically with age. Memory for the first serial position improved markedly between the ages of 5 1/2 and 6 1/2. Labels alone were superior to pictures at the end of the list, but pictures were superior to labels at the beginning. Combined picture and label presentation appeared to follow the curve for pictures at the beginning of the list and that for labels at the end. The results are discussed in terms of modality and mediation effects in children's short-term memory.

Berkowitz, G., & Farley, F. H. Reading readiness and early linguistic skills as a function of individual differences in the orienting response. Working Paper No. 94. 66 pp. December 1971.

The research paradigm of Farley and Manske on individual differences in the orienting response (OR) defined by heart rate (HR) deceleration was extended to performance in reading readiness tasks. The OR was measured in 114 kindergartners. Fifteen trials of pure tone stimulation (1000 cps, 61 db) followed by a 16th trial at 2000 cps and a light-off stimulus were presented. The ORs to the initial, 16th, and light-off trials were used in the analysis. A baseline-free measure of HR deceleration was employed. Reading-related tasks were the Metropolitan Readiness Tests and the de Hirsch battery. Principal components solution and normal varimax rotation indicated some contribution of the OR to the reading related tasks, though this was markedly moderated by sex.

Farley, F. H. Individual differences, learning and instruction: A selected bibliography. Working Paper No. 92. 54 pp. April 1972.

This bibliography was developed for the use of researchers and practitioners in the area of individual differences, learning and instruction. It is not exhaustive, given the enormous amount of writing on the topic, but hopefully it contains a useful selection of the work in this area.

Farley, F. H., Osborne, J. W., & Severson, H. H. The reliability and validity of salivation as a measure of individual differences in intrinsic arousal. Working Paper No. 51. 19 pp. November 1970.

Two studies were reported which attempted to estimate the stability and construct validity of human salivary response as a measure of individual differences (IDs) in physiological arousal. Twenty-second baseline estimates and 20-second response levels to four drops of lemon juice were measured, with the former value being removed from the latter to form the salivary score for a given S. The first study obtained a test-retest correlation over 24 hours for the net salivation score of 0.78 ($N = 25$; $p < .001$). The second study involved the measurement of the threshold of fusion of paired-light flashes (two-flash threshold [TFT]), a previously validated index of arousal, as well as salivation. The correlation between net salivation and TFT on 25 Ss was -.57 ($p < .01$). It was concluded that the salivary measure has demonstrated promising psychometric properties for use in ID research.

Farley, F. H., & Severson, H. H. The stability of individual differences in "strength" and "sensitivity" of the nervous system. Working Paper No. 34. 11 pp. February 1970.

The stability over 1 month of representative measures of strength ("modified shape of the curve") and sensitivity (absolute visual threshold—AVT) of the nervous system as determined from the research and theory of Teplov and associates at the University of Moscow was estimated on 15 Ss. The stability estimate for the "modified shape of the curve" measure was .61 ($p < .02$) while that for the AVT was .91 ($p < .001$). The results were discussed in regard to the Russian factor analytic identification of a dimension of strength, and in relation to the choice of strength measures for further research. A multiple-indices approach was recommended.

Golub, L. S., Fredrick, W. C., & Nelson, N. J. Items to test level of attainment of language arts concepts by intermediate-grade children. Working Paper No. 60. 73 pp. November 1971.

Using a 12-part paradigm for testing level of Concept Attainment, items were constructed for three topics in language arts—words, words in sentences, and connected discourse. Within each topic concepts presented in the middle elementary grades were identified and 10 concepts randomly selected for each topic. For each concept 12 items, one matching each task in the schema, were developed. The items are presented in the form resulting from item-tryouts and revision.

Golub, L. S., Fredrick, W. C., Nelson, N. J., & Frayer, D. A. Selection and analysis of language arts concepts for inclusion in tests of concept attainment. Working Paper No. 59. 95 pp. November 1971.

The procedures used to develop a list of concepts taught in fourth-grade language arts are described. Thirty concepts from the list were randomly sampled and then analyzed. Analysis consisted of listing examples and nonexamples, relevant and irrelevant attributes, subordinates and supraordinates, and a definition and principle for each concept. Based upon these analyses, items were written to test the attainment of each of the 30 concepts at twelve different levels. The items represent the application of a test-item model that prescribes the levels at which a concept can be tested. Analyses of the 30 selected concepts and illustrative examples of test items are presented in the paper.

Harris, M. L., & Harris, C. W. Newly constructed reference tests for cognitive abilities. Working Paper No. 80. 144 pp. November 1971.

One of the major steps in the project entitled "A Structure of Concept Attainment Abilities" is to identify reference tests for cognitive abilities. A part of this task involved the construction of some of these types of tests for use with fourth and fifth grade students. This paper presents 35 tests that were constructed or adapted for inclusion in a battery of reference tests for cognitive abilities appropriate for the fourth and fifth grade level.

Klausmeier, H. J., & Frayer, D. A. Cognitive operations in concept learning. Working Paper No. 36. 45 pp. March 1970.

A tri-level structure of cognitive operations in concept learning is proposed, based on results of controlled experimentation and factor analytic studies. Global strategies in concept attainment are hypothesized to consist of three phases: attending to the situation, searching for information, and processing and using the information. Research related to the structure and to each of the operations is summarized.

Levin, J. R., Davidson, R. E., Wolff, P., & Citron, M. Verbal and visual processes in children's learning: III. A comparison of induced imagery and sentence strategies. Working Paper No. 98. 13 pp. April 1972.

Samples of second and fifth graders were given a mixed list of word and picture paired associates to learn under one of four instructional conditions: regular, sentence generation, imagery generation, or joint imagery-sentence generation. Learning was measured in terms of either recall or recognition of the correct response. In both grades, it was found that children benefited from each of the mediational strategies to approximately the same degree. In conjunction with previous research, the present results clarify at least three important issues: (a) children as young as age seven are capable of generating interactive sentences or images; (b) the method of testing employed does not interact with strategy effectiveness at either grade; and (c) a combined imagery-sentence strategy does not produce greater facilitation than each of these separately, thereby lending support to Piaget's claim that the two processes are simply manifestations of the same cognitive structures.

Levin, J. R., & Horvitz, J. M. Verbal and visual processes in children's learning: I. Meaning in paired-associate learning. Working Paper No. 50. 20 pp. October 1970.

The role of meaning in the learning of verbally presented paired associates (PAs) is described by means of an experiment with a replication.

A printed PA list containing six different types of items was presented to sixth graders. Four of the item types consisted of sentence-embedded PAs on the study trials, followed by test trial cues varying in terms of their similarity in meaning to the study materials. The two remaining item types served as baseline measures of performance, i.e., controls. It was found that: (a) the greater the semantic similarity between the study and test trial contexts, the greater was the recall of PA items, while at the same time (b) control item types presented in conjunctive phrases were better recalled than those presented in sentences. Implications of these findings are discussed in terms of ongoing research into semantic and imaginal components of children's learning.

Levin, J. R., Kaplan, S. A., & Horvitz, J. M. Verbal and visual processes in children's learning: II. Facilitation differences related to task variations. Working Paper No. 72. 33 pp. June 1971.

Four experiments were conducted to determine the conditions under which sentence and imagery facilitation of paired associates is produced. In the first two experiments, fifth graders were randomly assigned to four groups in which to learn a paired-associate list consisting of twelve printed noun pairs. The groups differed with respect to the kind of utterance supplied by the experimenter in relating the two nouns in each pair (sentence vs. conjunctive phrase), as well as the way in which the materials were shown to the subject (nouns only vs. the complete sentence or phrase). In each of these experiments it was found that sentences facilitated learning only when they were heard, but not seen.

In the second two experiments, independent groups of sixth graders received visual imagery instructions (or regular instructions) prior to learning to associate eight pairs of pictures (or words). The findings were that imagery instructions for picture pairs were generally more facilitative than imagery instructions for word pairs, with children at this age exhibiting little variability in their capacity for employing visual imagery strategies when pictures comprised the learning materials. The results were discussed, and interpretations in terms of an age by strategy by mode of materials interaction were offered.

Romberg, T. A., & Steitz, J. Items to test level of attainment of mathematics concepts by intermediate-grade children. Working Paper No. 56. 70 pp. November 1971.

Using a 12-part paradigm for testing level of concept attainment, items were constructed for three topics in mathematics—sets, division, and expressing relationships. Within each topic concepts presented in the middle elementary grades were identified and 10 concepts randomly selected for each topic. For each concept 12 items, one matching each task in the paradigm, were developed. The items are presented in the form resulting from item-tryouts and revision.

Romberg, T. A., Steitz, J., & Frayer, D. A. Selection and analysis of mathematics concepts for inclusion in tests of concept attainment. Working Paper No. 55. (In press)

Schmuller, J. A., & Farley, F. H. Toward a multi-dimensional measure of clustering in free recall. Working Paper No. 95. 7 pp. December 1971.

Various reported measures of clustering in free recall are reviewed under categories of algebraic versus probabilistic approaches. Shortcomings in these measures are outlined and a new multi-dimensional measure is advanced which overcomes many of the deficiencies noted.

Scott, J. A., & Farley, F. H. Arousal and cognitive style. Working Paper No. 67. 29 pp. February 1971.

The effect of arousal manipulations on a measure of cognitive style was investigated in three experiments. On the basis of arousal, attention, and cue utilization theory it was predicted that increased arousal would render a S's performance increasingly analytic as opposed to global, or field independent as opposed to field dependent. Auditory noise was used to manipulate arousal, with two intensity levels being employed as well as a no-noise control condition. The first two studies used a buzzer-produced noise, while the third study used white noise. Cognitive style was measured by a Hidden Figures task.

No significant effect of arousal on cognitive style scores was obtained in any of the studies. This result was discussed in regard to the stability of individual differences in cognitive style.

Tabachnick, B. R., Weible, E. B., & Frayer, D. A. Selection and analysis of social studies concepts for inclusion in tests of concept attainment. Working Paper No. 53. 95 pp. November 1970.

Major social studies concepts taught to fourth graders in Madison, Wisconsin were identified by examining the school district course of study and social studies textbooks and by consulting central office supervisors and teachers. The concepts identified in this manner fell into three major categories: Geographic Region, Man and Society, and Map and Globe Study. Ten concepts were randomly selected from each category for inclusion in tests of concept attainment. Each of the selected concepts was analyzed to determine its constituent teachable elements. The analysis of a concept formed the basis for writing items to test its attainment. Analyses of all selected concepts and illustrative examples of test items are presented in the paper.

Tabachnick, B. R., Weible, E. B., & Livermore, D. Items to test level of attainment of social studies concepts by intermediate-grade children. Working Paper No. 54. 91 pp. November 1970.

Using a 12-part paradigm for testing level of Concept Attainment, items were constructed for three topics in social studies—Geographic Regions, Man and Society, Map and Globe study. Within each topic, concepts presented in the middle elementary grades were identified and 10 concepts randomly selected for each topic. For each concept 12 items, one matching each task in the schema, were developed. The items are presented in the form resulting from item-tryouts and revision.

Voelker, A. M., & Sorenson, J. S. Items for measuring the level of attainment of selected classificatory science concepts by intermediate-grade children. Working Paper No. 58. 143 pp. November 1971.

The procedures utilized in constructing test items designed to measure intermediate grade children's level of attainment of selected classificatory science concepts are described. Tests were prepared to measure children's level of concept mastery for 30 concepts, 10 each from the areas of biological science, earth science, physical science. For each concept, an item was written to measure children's ability to perform each of the 12 tasks of a schema for testing the level of concept mastery. The items presented have been revised on the basis of a pilot study conducted with children in the public schools.

Voelker, A. M., Sorenson, J. S., & Frayer, D. A. An analysis of selected classificatory science concepts in preparation for writing tests of concept attainment. Working Paper No. 57. 165 pp. November 1971.

A total of 30 classificatory science concepts, 10 each from the areas of the biological, earth, and physical sciences were selected and analyzed to provide a framework for preparing items to be used in testing a schema for measuring the level of concept mastery. The analysis of each concept consisted of identifying the relevant, irrelevant, and criterial attributes, selecting supraordinate, coordinate, and subordinate concepts, formulating a definition, and listing examples and nonexamples.

Wilder, L. Speech processes and cognitive learning in young children: Needs and specifications. Working Paper No. 75. 12 pp. September 1971.

This paper presents the need for research on speech processes and cognitive learning in young children, as well as the background for such a project within the Wisconsin Research and Development Center for Cognitive Learning. The studies for FY 72 and the general research goals of this project are discussed.

Wilder, L. Spoken rehearsal and verbal discrimination learning. Working Paper No. 76. 18 pp. October 1971.

The frequency theory of verbal discrimination learning makes no distinction between silent and spoken rehearsal. Further, the frequency theory predicts that the study-test method of list presentation is superior to the anticipation method. College students, performing under silent and spoken rehearsal conditions, learned 16 low-frequency word pairs with the anticipation or the study-test method.

It was found that spoken rehearsal was superior to silent rehearsal, and that method of presentation was not significant. However, in the spoken rehearsal condition, a trend toward the predicted differences between the two presentation methods was observed. It was suggested that these findings indicate that spoken rehearsal insures the rehearsal of the correct response, and that silent rehearsers probably do not silently pronounce the correct response to themselves. Implications for the role of spoken rehearsal in verbal discrimination learning were discussed.

Wilder, L. Three dimensions of the cognitive function of speech: Papers presented at the 57th Annual Meeting of the Speech Communication Association. Working Paper No. 83. 47 pp. December 1971.

These papers were presented at the 57th Annual Meeting of the Speech Communication Association in San Francisco, December 27-30, 1971. "Perspectives on Research in Speech and Cognitive Processes" was presented to a panel session on "Speech Communication Research of the '70s: Six Priority Areas," sponsored by the Research Board of SCA. It reviews the past and current research on the cognitive function of speech. "Speech as Communication and Verbal Behavior" was read to a Dimension Series panel on "The Centrality of the Spoken Word," and it is concerned with speech as a unique response modality in human communication and verbal behavior. "Speech Processes and Cognitive Learning in Young Children" was presented to the Educational Policies Board program on "Speech in the Classroom: A Digest of Information on Oral Language Development for the Classroom Teacher," and it reviews the theory and pedagogical implications of the cognitive function of speech in young children.

Wilder, L., & Harvey, D. J. Overt and covert verbalization in problem solving. Working Paper No. 77. 13 pp. October 1971.

This study explored the effects of overt and covert verbalization instructions on problem solving in high school subjects. A series of three-circle problems was administered to groups instructed to either (1) say a reason for each move they made (overt verbalization), (2) think of a reason for each move as if they were going to say it (covert verbalization), or (3) work the problems silently (control).

Consistent with previous findings, subjects instructed to overtly verbalize were superior to control subjects on a transfer task requiring no overt verbalization. No significant differences, however, were observed between overt and covert verbalizers. This finding was interpreted to indicate that, in adults, covert verbalization can be as effective in mediating problem-solving behavior as talking aloud. It was suggested that this may not hold true for children, however.

Component R2
Conditions of School Learning and Instructional Strategies

Empirical Validation of the Instructional Programing Model

Instructional Variables in Concept Learning

Analysis of Peer Teaching Techniques

Analysis of Prereading Skills

Development of Reading Comprehension Skills

Development of Problem Solving Strategies in Mathematics

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TECHNICAL REPORTS; THEORETICAL & PRACTICAL PAPERS; BOOKS

Allen, V. L., & Boyanowsky, E. O. Generalization of independence produced by social support. Technical Report No. 109. 15 pp. December 1969. ED 039 618.

The present study was conducted to determine whether independence produced by social support provided on one type of item in a group-pressure situation would generalize to a different item on which the subject was opposed by a consensual group.

Subjects were 180 female undergraduates who were tested in groups using a Crutchfield kind of apparatus. Results showed that social support, i.e., the presence of a partner answering immediately prior to the subject, significantly reduced conformity on both visual and opinion items. Generalization of independence from social support to consensual group trials was not obtained.

Allen, V. L., & Bragg, B. W. Effect of group pressure on memory. Technical Report No. 30. 11 pp. September 1967. ED 016 600.

The effect of group pressure on the retention of previously learned material was investigated with a paired-associate task. Subjects received correct feedback, incorrect feedback, or no feedback, either from one person or from a group.

Allen, V. L., & Bragg, B. W. *Effect of social pressure on concept identification*. Technical Report No. 31. 9 pp. September 1967. ED 016 597.

Unanimous group feedback, correct or incorrect, was utilized to study the effect of feedback on concept identification and the transfer of its effect to a second concept identification problem.

Allen, V. L., & Bragg, B. W. *Ordinal position and conformity*. Technical Report No. 95. 9 pp. September 1969. ED 035 960.

The role-modeling theory was applied to the problem of birth-order and conformity to a same-sex peer group. Subjects were male and female college students from two-sibling families. The pattern of results for conformity was congruent with predictions made from role-modeling theory.

Allen, V. L., & Levine, J. M. *Creativity and conformity*. Technical Report No. 33. 11 pp. November 1967. ED 019 747.

Conformity in group pressure was compared for 76 fifth-grade *S*s who received creativity training and for 88 matched controls.

Allen, V. L., & Levine, J. M. *Consensus and conformity*. Technical Report No. 41. 11 pp. January 1968. ED 020 552.

Two methods of breaking group consensus were employed in this study, and the effects on the responses of college subjects to both objective and subjective stimuli were measured. The results suggest the need for modification of existing theories of conformity behavior. In addition these results emphasize the differences in conformity of males and females.

Allen, V. L., & Levine, J. M. *Social support and conformity: The effect of differentiation from the group and order of responding*. Technical Report No. 72. 8 pp. January 1969.

Directed toward the identification of the effects of peer group pressures on the utilization of concepts already learned and on the learning of new concepts, two variables relevant to explaining the social support phenomenon were investigated. Possible mechanisms underlying the position and contact effects were discussed.

Allen, V. L., & Levine, J. M. *Social support and conformity: The role of independent assessment of reality*. Technical Report No. 83. 11 pp. April 1969. ED 035 955.

This study investigated the role of one factor in the dramatic conformity reduction produced by a partner who agrees with *S* in the face of group pressure—the independent assessment of social and physical reality provided by the partner is crucial to the efficacy of social support in reducing conformity.

Allen, V. L., & Newtson, D. *Conformity, anticonformity, and independence*. Technical Report No. 88. 21 pp. June 1969. ED 035 951.

The present studies tested the hypothesis that a social supporter with negative task-related characteristics would be less effective in reducing conformity in a group pressure situation than a social supporter without such negative characteristics. The hypothesis was tested in a standard Crutchfield simulated group.

Allen, V. L., & Newtson, D. *The development of conformity and independence*. Technical Report No. 164. 19 pp. April 1971.

Age trends in conformity and independence were investigated in an Asch kind of conformity situation with 366 children from the first, fourth, seventh, and tenth grades. Unanimous peer pressure was found to yield decreasing conformity with age, being more pronounced for males than for females. Adult influence declined with age for both sexes. Social support from a partner who gave correct or modal answers reduced conformity to a constant low level across all ages. It was concluded that mechanisms of group influence are highly similar across age, and that age trends may reflect variations in situational factors associated with age differences.

Arganian, M. P., Frayer, D. A., Goldman, J. A., Lubin, S. K., & Storck, P. A. Acquisition of the concept biodegradable through written instruction: Pretest and age effects. (In press)

Askov, E. N. Assessment of a system for individualizing reading instruction. Technical Report No. 117. (Ph.D. dissertation) 87 pp. March 1970. ED 040 840.

This study was designed to assess the effects of using the Wisconsin Prototypic System of Reading Skill Development, an experimental program which emphasizes diagnosis of reading skill development and instruction geared to individual skill needs. Pupil attitudes toward recreational reading were compared considering grade and achievement level. Those areas most directly affected by the experimental treatment showed change—i.e., teachers' classroom procedures and attitudes toward individualized reading instruction.

Askov, E. N. Assessment of attitudes toward reading in primary pupils. Technical Report No. 206. 25 pp. January 1972.

The rationale for the development of the Primary Pupil Reading Attitude Inventory is presented. The process of developing, using, and subsequently revising the instrument is described. Findings from additional studies are then presented to provide further information about subtest and item characteristics of the instrument.

Barganz, R. A. The morphophonemic performance of good and poor readers. Technical Report No. 182. (Ph.D. dissertation) 144 pp. November 1971.

The primary purpose of this study was to investigate the ability of good and poor readers in grade five to recognize the form of derived words where morphophonemic alternation occurs but orthographic consistency exists. Drawing primarily upon the theoretical frameworks of Chomsky and Halle, Venezky, and MacDonald, the study focused upon the psychological validity of phonological and reading competence models.

A pattern was revealed suggesting that good readers can more ably recognize the underlying forms of words than poor readers. When surface structures are related these differences between good and poor readers diminish.

Buchanan, A. E., Hansen, P. J., & Quilling, M. R. Effects of increased home-school contact on performance and attitude in mathematics. Technical Report No. 89. 5 pp. June 1969. ED 036 446.

The purpose of this experiment was to study the influence of increased home-school contact on children's performance and attitudes in mathematics. Both the single and combined effects of frequent parent-teacher conferences and of homework were studied.

Burmeister, L. E. An evaluation of the inductive and deductive group approaches to teaching selected word analysis generalizations to disabled readers in eighth and ninth grades. Technical Report No. 12. (Ph.D. dissertation) 41 pp. November 1966. (Out of print) ED 010 514.

Following the identification of generalizations at approximately a 90% utility level applying to words above the primary level in difficulty, two-week instructional plans prepared by the author were used in teaching. Scores on both oral and silent posttests were analyzed.

Calfee, R. C. Short-term retention in normal and retarded children as a function of memory load and list structure. Technical Report No. 75. 25 pp. February 1969. ED 031 831.

Studies of recall and recognition short-term memory (STM) were reviewed and a series of studies of serial recognition memory of normal and retarded children was described. From experiments using a recall procedure it was concluded that important variables affecting adult performance also had comparable effects on normal and retarded children. Except for response biases and forgetting rate, recognition memory processes of normal and retarded children appeared to be identical to those of adults.

Calfee, R. C. The role of mathematical models in optimizing instruction. Theoretical Paper No. 17. 27 pp. March 1969. (Out of print) ED 039 102.

With the advent of computers in the classroom, the decision structure implicit in the teaching process has been obvious. Given a descriptive model of the learning process, it is in some cases possible to derive optimal conditions for instruction.

Calfee, R. C., & Jameson, P. Visual search and reading. Technical Report No. 157. 10 pp. March 1971. ED 050 924.

Subjects (Ss) were asked to look for occurrences of words from a target list while reading a passage for comprehension. In Experiment I, Ss searched for the specific words in the target list, in Experiment II for any close associate of words in the target list. Reading speed was affected only by the number of words in the target list. Neither the number of target words nor the number of occurrences had any effect on comprehension. The results indicate that central memory load limits reading speed, but that scanning and decoding processes are so automated that they are unaffected by the additional tallying operation in this task.

Calfee, R. C., Venezky, R. L., & Chapman, R. S. Pronunciation of synthetic words with predictable and unpredictable letter-sound correspondences. Technical Report No. 71. 15 pp. February 1969.

A list of synthetic words was prepared for testing the pronunciation of predictable patterns, unpredictable patterns, and miscellaneous spellings. Participating in the study were third and sixth graders from two elementary schools, eleventh graders, and college students.

Carpenter, T. P. The role of equivalence and order relations in the development and coordination of the concepts of unit size and number of units in selected conservation type measurement problems. Technical Report No. 178. (Ph.D. dissertation) 141 pp. August 1971.

This study was designed to investigate the development of certain measurement concepts, to relate this development to the development of conservation, and to determine the role of equivalence and nonequivalence relations in conservation and measurement problems. Subjects were children in grades K-2.

The results indicate that: (1) There is no significant difference in difficulty between conservation and measurement problems due to different combinations of equivalence and nonequivalence relations. (2) Measurement processes are meaningful to most first- and second-grade students and can be used to compare quantities; however, a significant number of young children readily abandon measurement choices if they are followed by conflicting visual cues; and the majority of first- and second-grade students do not recognize the importance of a constant unit of measure and incorrectly apply measurement processes that involve more than one unit of measure. (3) Numerical conflict produced by measuring with different units of measure results in the same degree of errors as the visual conflict produced by pouring liquids into different-shaped containers in the classical conservation problems. (4) Most conservation and measurement errors result from children centering on an immediate dominant dimension; consequently, problems in which the correct cues appear last are significantly easier than problems in which they are followed by distracting cues. Order, however, is not the only significant variable. Problems in which correct cues are numerical are significantly easier than similar problems in which correct cues are visual.

Carpenter, T. P. The performance of first-grade students on a nonstandard set of measurement tasks. Technical Report No. 211. 19 pp. December 1971.

This study was designed to examine first-grade students' understanding of several basic measurement processes. Twenty Ss randomly selected from five first-grade classes in two different schools were individually examined on eleven measurement tasks. Seven of the tasks were adapted from items reported in the Gal'perin and L. S. Georgiev study designed to test young children's understanding of the unit of measure. In these tasks, Ss were asked to measure and compare piles of rice using different-sized spoons, measure out lengths of string, etc. Four additional tasks were patterned after the Soviet problems except that Ss had to respond strictly on the basis of numerical cues with no physical evidence present.

Ss generally had difficulty with the tasks. Only one of the Soviet problems was answered correctly by more than half of the Ss tested. However, these difficulties did not appear to stem from an incorrect characterization of the unit of measure as hypothesized by Gal'perin and Georgiev. They seemed to be more the result of Ss' inability to conserve, their inexperience with the specific measurement operations, and an ambiguity in several of the items.

More specifically, the study showed that Ss did not have a stable concept of measurement, nor were they able to appreciate the value of a constant unit of measure. There was little transter between measurement tasks. Measurement tasks involving unequal quantities were easier than similar tasks involving equal quantities. Moreover, Ss readily shifted bases of comparison of quantities, even on the same task. And finally, the study showed that numerical cues were almost as strong as physical cues in certain conservation tasks.

Chapman, R. S., & Kamm, M. R. An evaluation of methods for teaching initial sound isolation. Technical Report No. 212. 9 pp. February 1972.

The ability to analyze a word into its component sounds is prerequisite to a child's learning of letter-sound correspondences and therefore to his learning to read. As prereaders do not typically master the ability to analyze a word into its component sounds, techniques must be developed to teach them this skill. Most procedures which have been tried have not been successful with children younger than 6 or 7 years; however, Zhurova reports success teaching even 3-year-olds to isolate initial sounds of words with the method she describes. The current experiment evaluated Zhurova's iteration method of instruction by comparing it with a segmentation method. Ss were 32 kindergartners. The two methods of instruction were fully crossed with four sequences of real-word and nonsense-stimulus items, given in two training sessions. None of the six variables was significant; however, training time had a significant effect.

Chapman, R. S., & Ting, A. The consistency of articulation errors in young children. Technical Report No. 153. 11 pp. March 1971. ED 050 926.

Forty normal children aged 3 1/2 to 5 1/2 were tested on the pronunciation of initial /-l/, /-r/, and /s-/ clusters in 120 words. The phonemes /l/, /r/, and /s/ occurred 36, 48, and 42 times, respectively; other phonemes in the cluster occurred from 6 to 18 times. Articulation errors of individual Ss were examined for evidence of degree and type of consistency, including consistency in rate of error; the articulatory feature changed in substitution errors, regardless of phoneme; and the error made on a phoneme.

It was found that children typically made the same number of errors when retested on similar lists, but not on the same items. There was little evidence for consistency in making errors on particular phonemes or features. Few children mispronounced any phoneme more than 50% of the time; indeed, most missed a phoneme in initial or final position in a cluster only once. In the few instances in which children made more than one error on a phoneme, however, the error made was usually the same; that is, Ss were consistent in the error made.

The implications of these findings for test construction and clinical work with speech-defective children are discussed.

Chapman, R. S., & Ting, A. The effect of mode of elicitation in articulation testing. Technical Report No. 154. 11 pp. March 1971. ED 050 925.

Differences in articulation error rates and error patterns were examined as a function of five elicitation modes: picture, picture with pretraining, word repetition, sentence repetition, and nonsense word repetition. The same 15 words (or pictures representing them) were used as stimuli in the four real-word conditions; nonsense words were formed by recombining the vowels and final consonants of the real words.

Subjects (Ss) were 22 preschoolers, 8 kindergartners, 10 first graders, and 24 college students. Each S was tested in each mode with order of testing counterbalanced. Errors in initial consonants, initial consonant clusters, vowels, final consonants, and final consonant clusters were scored separately.

Error rates and error patterns were similar for the four real-word modes. The nonsense words showed an error rate three times higher than that of the real-word modes and, in contrast with the real-word modes, increased rather than decreased from initial to final position.

The effect of test items which are effectively nonsense is discussed for normative and correlative studies. Additional considerations bearing on the choice of real-word testing modes are presented.

Cicirelli, V. G. Concept learning of young children as a function of sibling relationships to the teacher. Technical Report No. 175. 46 pp. October 1971.

This study of the attainment of the trapezoid concept by first-grade children when taught by third-grade children attempted to answer the question: Is a sibling relationship associated with concept learning of a younger child taught by an older child? Each of the 120 first-grade children in the study had an older sibling in third grade; equal samples of 30 sibling pairs were drawn from the population of boys with older sisters, boys with older brothers, girls with older sisters, and girls with older brothers. For half of these children, the older sib served as the teacher of his or her younger sib; the remaining half were re-paired so that the older child taught an unrelated first-grade child. Once the older child was trained in the concept, he taught it to the younger child in a ten-minute session. It was found that male learners scored higher on the trapezoid concept attainment test than female learners; learners scored higher when they were taught by a female sib than when they were taught by a male sib or a female nonsib. Girls teaching their sibs used a deductive teaching method more than other groups. Learners with higher concept attainment scores also showed greater awareness of the relevant attributes of the concept. Results can be interpreted in terms of role theory and sibling rivalry and have implications for the selection of older children for use in school tutoring programs.

Davidson, N. The small group-discovery method of mathematics instruction as applied in calculus. Technical Report No. 168. (Ph.D. dissertation) 375 pp. October 1971. (Out of print)

This paper reports the development of a new strategy of mathematics instruction in which students work together in small groups to discover mathematical results. The strategy is named the "small group-discovery method." To determine the feasibility of the method, a one-year pilot study was conducted with a class of college freshmen studying calculus.

On a comparative final examination, the students in the pilot class scored slightly better, but not significantly better, than the students in a control section taught by the lecture-discussion system. The students in the discovery class performed very credibly on seven take-home examinations. An open-ended questionnaire showed that the pilot class had either positive or non-negative effects upon each student's interest in mathematics and estimate of his problem-solving skill. The study indicated that the small group-discovery method deserves intensive investigation as an approach for instruction and curriculum development, and a number of problems were stated for further investigation.

Fang, M. C. S. Effect of incentive and complexity on performance of students from two social class backgrounds on a concept identification task. Technical Report No. 10. (Master's thesis) 24 pp. September 1966. ED 010 512.

Mr. Fang extended the use of materials previously used with subjects of two socioeconomic levels. Concept identification problems of three levels of complexity were solved under three incentive conditions.

Fennema, E. H. A study of the relative effectiveness of a meaningful concrete and a meaningful symbolic model in learning a selected mathematical principle. Technical Report No. 101. (Ph.D. dissertation) 192 pp. July 1969. ED 036 444.

The purpose of this study was to determine the relative effectiveness of a meaningful concrete and a meaningful symbolic model in learning a selected mathematical principle. Subjects were from a second-grade population.

Frayer, D. A. Effects of number of instances and emphasis of relevant attribute values on mastery of geometric concepts by fourth- and sixth-grade children. Technical Report No. 116. (Ph.D. dissertation) 112 pp. in 2 vols. March 1970. ED 040 878.

The object of this study was to determine the effect of the number of instances and the emphasis of relevant attribute values on the level of concept mastery.

Eight versions of programmed lessons dealing with geometric concepts were prepared in which the independent variables of number of instances (4 or 8) and emphasis of relevant attribute values (presence or absence of attention-directing and review questions) were varied systematically. The subjects were fourth- and sixth-grade children.

Frayer, D. A., & Klausmeier, H. J. Variables in concept learning: Task variables. Theoretical Paper No. 28. 37 pp. September 1971. ED 057 402.

This paper focuses on task variables; research dealing with instructions, temporal factors, and feedback is critically reviewed and synthesized. Variables related to each of these factors are identified and generalizations are drawn concerning their effects. Implications of these generalizations for a model of cognitive operations and for educational practice are also presented.

Fredrick, W. C. The effects of instruction, concept complexity, method of presentation, and order of concepts upon a concept attainment task. Technical Report No. 3. (Master's thesis) 26 pp. November 1965. (Out of print) ED 010 203.

In the concept-attainment experience described, sex of the subject, number of relevant and irrelevant attributes, type of instruction, and order of concepts were analyzed as independent variables. Several measures of transfer were obtained.

Fredrick, W. C., Golub, L. S., & Johnson, S. L. Analysis of the "Linguistic Ability Test," Grades 4 and 6. Technical Report No. 121. 35 pp. March 1970. (Out of print) ED 040 401.

The Linguistic Ability Test was designed, pilot tested, revised, and field tested in an attempt to measure the skills implied by psycholinguistic ability. The future importance of the LAT is projected, and the test, along with its planned revisions, is included in the report.

Gaa, J. P. Goal-setting behavior, achievement in reading, and attitude toward reading associated with individual goal-setting conferences. Technical Report No. 142. (Ph.D. dissertation) 151 pp. in 2 vols. September 1970. ED 047 920 No. 1. ED 047 921 No. 2.

The study was designed to investigate the effects of individual goal-setting conferences on attitudes toward reading and classes in reading skills, reading skill achievement, and goal-setting behavior. Two parallel studies were conducted using students in two units of a multiunit elementary school, who were placed in three treatment groups: individual goal-setting conferences, individual conferences, and control.

Achievement level, attitude toward reading, number of goals set and achieved, and confidence in achievement of goals were measured. The results showed no difference in attitude among the groups, but a difference in achievement level was shown in one study by those students participating in goal-setting conferences. They also showed a smaller absolute difference in number of goals set and achieved, but less confidence in achieving their goals.

Gilbert, L. E. An introduction of length concepts to kindergarten children. Technical Report No. 102. 92 pp. July 1969. ED 036 335.

This study was an attempt to explain mathematically the concept of length to kindergartners. Conservation of length is generally not achieved, according to Piaget, until the age of 7 or 8.

Goldring, S. L. The effect of presentation and test mode on short-term retention of words. Technical Report No. 68. 17 pp. January 1969.

This experiment employed Sternberg's procedure to investigate the effects of presentation and test modalities (auditory or visual), and number of presentations of the processing rate of monosyllabic words of varying graphemic and phonemic length. 20 college students and 20 sixth graders served as Ss. Each S received all conditions and lists in a 10 x 10 Graeco-Latin square design.

Golub, L. S., & Fredrick, W. C. Linguistic structures and deviations in children's written sentences. Technical Report No. 152. 11 pp. December 1970. ED 048 272.

The types of linguistic structures and deviations appearing in the written discourse of fourth and sixth graders were tabulated. The discourse samples were grouped into three categories, high, medium, and low, and then compared on each of 63 measures. Themes rated high were longer than average while low themes were shorter and showed little use of such structures as subordinate clauses, modals, and adverbs. Grade and sex differences were apparent in the measures. Females produced more discourse than males and sixth graders wrote longer T-units than fourth graders. Syntactical and lexical deviations were counted and categorized. Only 24 categories of syntactic deviations appeared and the lexical deviations also seemed to fall into a few general groups. Such groupings present the possibility of a rational approach to teaching the standard syntax and spelling. Implications of the results for the elementary language program are stated.

Golub, L. S., & Fredrick, W. C. Linguistic structures in the discourse of fourth and sixth graders. Technical Report No. 166. 36 pp. July 1971.

This paper is part of an attempt to measure the language behavior of students in the upper elementary grades. It describes the procedures and results of research in these five areas: (1) Relationship between the Linguistic Ability Test and the written discourse of fourth- and sixth-grade students. (2) Comparisons of the discourse of fourth and sixth graders and of males and females. (3) Analysis of the effects of color and abstractness of pictures and of the specificity of instructions used in obtaining written discourse samples. (4) Comparisons of written discourse rated good, average, and poor. (5) Comparison of oral and written discourse. Discourse samples from 160 Ss were measured using 63 variables that considered both quantity and complexity of output.

Golub, L. S., Fredrick, W. C., & Barganz, R. A. Present and proposed needs, objectives, and components of a language learning program. Theoretical Paper No. 29. 83 pp. September 1971. ED 058 223.

The general purpose of this paper is twofold. One is to survey the research and literature on the learning of oral and written language in the elementary schools. The other is to propose a statement of needs, objectives, and components for an oral and written language program for elementary-grade children.

The method used for this study consists of five steps: (1) A survey and consensus of knowledge expressed by (a) language scholars and researchers, (b) curriculum specialists, and (c) teachers and other practitioners; (2) A survey of materials and methods presented in current textbooks for teachers and students; (3) A survey of students' and teachers' future needs in school and society; (4) Statements of needs and objectives of an elementary oral and written language program; and (5) A proposal for the components of such a program. The results of each of these steps are presented in this paper.

Johnson, D. D. Factors related to the pronunciation of vowel clusters. Technical Report No. 149. (Ph.D. dissertation) 207 pp. September 1970. ED 049 910 No. 1. ED 049 911 No. 2. ED 049 912 No. 3.

The pronunciations given by children to synthetic words containing vowel clusters were analyzed in relation to common English words containing the same vowel clusters. Independent variables dealt with in the study were grade level, reading level, community background, and sex. The pronunciations of older children approximated the vowel.

Johnson, D. D. An investigation of sex differences in reading in four English-speaking nations. Technical Report No. 209. 20 pp. February 1972.

Investigations reported during the past century have generally shown girls to be better readers than boys in the United States. Some researchers have attributed these differences to biologicalmaturational factors; others have suggested cultural-societal causes. The present study sought to examine this dichotomy by testing the reading ability of boys and girls in four English-speaking nations. More than a thousand elementary children from Grades 2, 4, and 6 in Canada, England, Nigeria, and the United States participated. Each subject was tested for reading comprehension, vocabulary, and various word analysis skills. A univariate analysis of variance in which sex (2) was nested within grade (3) and grade (3) within country (4) was applied to the data for each of eight analyses. Dependent variables were raw test scores, grade equivalent scores, or composite scores. In two countries, England and Nigeria, boys generally scored higher than girls and the sex differences favoring boys increased by sixth grade. Conversely, in Canada and the United States girls generally scored higher than boys and the sex differences favoring girls diminished or disappeared by sixth grade. Results of the study indicate that sex differences in reading ability are culturally related.

Johnson, D. D., & Venezky, R. L. An instrument for testing pronunciations of vowel clusters. Part I: Linguistic background. Technical Report No. 137. 30 pp. July 1970. ED 046 626.

The present report is the first of two describing a study of factors influencing children's pronunciations of vowel clusters at different ages. In this report are presented data on vowel cluster pronunciations in English, the linguistic rationale for the selection of vowel digraphs used in the study, and a description of the testing instrument devised. Results of the study will be presented in a second report.

Kamil, M. L. Memory for parallel structure and repeated items in compound sentences and digit, letter, and word strings. Technical Report No. 119. (Ph.D. dissertation) 95 pp. March 1970.

Five experiments were conducted to answer two major questions with regard to short-term memory for sentences: First, what are the specific effects of repeating words in compound sentences? Second, what are the differences in encoding processes in short-term memory for natural language materials compared with non-linguistic material?

The significance of the findings is that they point to a general short-term memory encoding strategy for compound sentences and digits, letter, and word strings with compound structures.

Kennedy, B. J. Motivational effects of individual conferences and goal setting on performance and attitudes in arithmetic. Technical Report No. 61. 20 pp. July 1968. (Out of print) ED 032 113.

The purpose of this experiment was to compare the motivational effects of cognitive incentives in the form of different goal-setting techniques and to investigate the combined effects of cognitive incentives with social interaction in individual pupil-teacher conferences. Results are discussed and interpreted in relation to a classroom research setting.

Klausmeier, H. J., Davis, J. K., Ramsay, J. G. Fredrick, W. C., & Davies, M. H. Concept learning and problem solving: A bibliography, 1950-1964. Technical Report No. 1. 80 pp. October 1965. (Out of print) ED 010 201.

In addition to the bibliography, a definition of concept in terms of attributes and a taxonomy of variables in concept learning are incorporated into the report. Articles from the 45 journals scanned are listed alphabetically by author in either a concept-learning or a problem-solving section and in a combined bibliography by journal by year. An author index is included.

Klausmeier, H. J., Frayer, D. A., & Sunde, M. L. A supplement to Technical Report No. 82. Concept Learning: A bibliography, 1970. Technical Report No. 183. 49 pp. December 1971.

This report, a supplement to Technical Report No. 82, is designed to aid the researcher concerned with concept learning. It contains (1) rationale and strategy for compiling a bibliography of articles concerned with concept learning, (2) a definition of the word "concept," (3) a system for classifying articles by their content, (4) a bibliography of relevant articles arranged alphabetically by author, and (5) a bibliography of the articles arranged according to their content.

Klausmeier, H. J., Robinson, P. E., Frayer, D. A., & DeVault, M. L. A supplement to Technical Report No. 82. Concept Learning: A bibliography, January-June, 1969. Technical Report No. 120. 36 pp. March 1970. ED 043 092.

This publication contains a rationale and strategy for compiling the bibliography, a definition of the word "concept," a system for classifying articles by their content, a bibliography of articles dealing with concept learning, and a list of bibliographic entries grouping articles according to the classification system.

Klausmeier, H. J., Robinson, P. E., Frayer, D. A., & DeVault, M. L. A supplement to Technical Report No. 82. Concept Learning: A bibliography, July-December 1969. Technical Report No. 147. 36 pp. November 1970.

This report, a supplement to Technical Report No. 82, is designed to aid the researcher concerned with concept learning. It contains (1) rationale and strategy for compiling a bibliography of articles concerned with concept learning, (2) a definition of the word "concept," (3) a system for classifying articles by their content, (4) a bibliography of relevant articles arranged alphabetically by author, and (5) a bibliography of the articles arranged according to their content.

Klausmeier, H. J., Sterrett, B. E., Frayer, D. A., Lewis, S. B., Lee, V. W., & Bavry, J. L. Concept Learning: A bibliography, 1950-1967. Technical Report No. 82. (Replaces Technical Report No. 1.) 171 pp. April 1969. ED 035 954.

This publication contains a rationale and strategy for compiling the bibliography, a definition of the word "concept," a system for classifying articles by their content, a bibliography of articles dealing with concept learning, and a list of bibliographic entries grouping the articles according to the classification system.

Klausmeier, H. J., Sterrett, B. E., Robinson, P. E., Frayer, D. A., & Bavry, J. L. A supplement to Technical Report No. 82. Concept Learning: A bibliography, 1968. Technical Report No. 107. 62 pp. November 1969. ED 036 865.

Included in this report are: Rationale and strategy for compiling a bibliography of articles concerned with concept learning, a definition of the word "concept," and a bibliography of the articles arranged according to their content.

Koenke, K. The effects of a content-relevant picture on the comprehension of the main idea of a paragraph. Technical Report No. 56. 34 pp. June 1968. (Out of print) ED 024 540.

The importance of content-relevant pictures to the comprehension of the main idea in a paragraph was investigated. Various reading conditions were constructed which contained a paragraph, a picture, or both, each with three types of instructions. In addition, the effects of readability of the paragraphs and grade placement of the students (third and sixth grades) were examined.

Levin, J. R. Some thoughts about cognitive strategies and reading comprehension. Theoretical Paper No. 30. 8 pp. December 1971.

Psychological experiments investigating imposed and induced cognitive strategies are reviewed and related to operations in reading comprehension. It has been suggested that comprehension differences between good and poor readers may arise from the way in which they habitually organize intra- and inter-sentence elements during input. Subject-generated visual imagery is singled out as a particularly effective organizational strategy. Implications of this research are considered in the context of aptitude by treatment interactions and individual differences.

Levine, J. M., & Allen, V. L. Reactions to attitudinal deviancy. Theoretical Paper No. 14. 16 pp. November 1968.

This analysis of social influences on human learning presents a critical review of empirical and theoretical treatments of group reaction to attitudinal deviancy. Data are presented which indicate that individuals who deviate in non-attitudinal spheres are not always rejected. In some settings, they are not only tolerated, but also encouraged.

Marliave, R. S. Attitude, self-esteem, achievement, and goal-setting behavior associated with goal-setting conferences in reading skills. Technical Report No. 176. (Master's thesis) 116 pp. October 1971.

This study was designed to investigate the effects of goal-setting conferences on attitude, self-esteem, achievement, and goal-setting behavior. Fourth-grade Ss were divided into high, medium, and low levels of previous reading achievement. Twenty-one Ss were randomly selected from each achievement level and randomly assigned to one of three treatment groups: goal-setting conference, conference-only, or control.

After four weeks of treatment, attitude, self-esteem, and achievement were measured with the Reading Attitude Inventory, the Self-Esteem Measure, and subtests of the Wisconsin Tests of Reading Skill Development, respectively. During the fifth week, Ss in both the goal-setting and conference-only groups set goals, and data were gathered on their goal-setting behavior. The effect of previous level of achievement was significant in terms of attitude, self-esteem, achievement, and goal-setting behavior. No other significant effects were found.

Naeser, M. A. Criteria for the segmentation of vowels on duplex oscillograms. Technical Report No. 124. 18 pp. March 1970. ED 041 280.

This paper develops criteria for the segmentation of vowels on duplex oscillograms. Previous vowel duration studies have primarily used sound spectrograms, permits faster production (real time) at less expense (adding machine paper may be used).

Naeser, M. A. Influence of initial and final consonants on vowel duration in CVC syllables. Technical Report No. 130. 16 pp. June 1970. ED 042 149.

The study investigates the influence of initial and final consonants /p, b, s, z/ on the duration of four vowels /ɪ, i, u, ae/ in 64 CVC syllables uttered by eight speakers of English from the same dialect area.

The vowels showed significantly different mean vowel duration, /ɪ/ being shortest and /ae/ being longest.

Naeser, M. A. The American child's acquisition of differential vowel duration. Technical Report No. 144. (Ph.D. dissertation) 216 pp. in 2 vols. August 1970. ED 047 928 No. 1. ED 047 929 No. 2.

The development of differential vowel duration was observed in six children who were tape recorded at one month intervals from 26 to 36 months of age, and in three children from 21 to 24 months of age. By differential vowel duration is meant the relatively different durations of vowels according to whether the following consonant is voiced or voiceless, stop or fricative. The children's task was to produce a series of CVC English words using each of the vowels /ɪ, i, ʊ/ before one voiceless and one voiced fricative.

The children's responses were tape recorded, vowel duration measurement made on duplex oscillograms, and productions of final consonants transcribed by three linguists.

Results showed that acquisition of differential vowel duration preceded control of the voicing feature which conditions it in adult English. Three states in the acquisition of differential vowel duration in American English are posited.

Nelson, B. A., & Frayer, D. A. The effects on short- and long-term retention of discovery and expository methods of presenting selected geometry concepts: A replication. Technical Report No. 208. 37 pp. February 1972.

This study was designed to investigate the effects of discovery and expository methods of presentation on the immediate acquisition and retention of geometry concepts by seventh graders. Four geometry concepts, quadrilateral, rhombus, trapezoid, and parallelogram, were presented in written lessons which used either an expository or a discovery approach. Ss studied the lessons on four consecutive days. They were given a test on the concepts either immediately after completion of the lessons or 1 day or 21 days after completion of the lessons. Ss who received the test 1 day after completion were retested 21 days after completion.

The findings of the study were as follows: (a) Ss who studied the expository lessons had significantly higher scores than Ss who studied the discovery lessons. (b) An independent groups analysis revealed no significant difference between treatment groups. However, a repeated measures analysis revealed that Ss in the discovery group tended to forget less than Ss in the expository group over the 21-day retention interval. (c) The expository group spent only one-third as much time on the lessons, yet had immediate acquisition superior to the discovery group and 21-day retention equal to the discovery group.

Olton, R. M., Wardrop, J. L., Covington, M. V., Goodwin, W. L., Crutchfield, R. S., Klausmeier, H. J., & Teckla, R. The development of productive thinking skills in fifth-grade children. Technical Report No. 34. 39 pp. November 1967. ED 021 312.

Self-instructional programmed lessons were used to study the relationships (1) between productive thinking abilities and other learner characteristics such as IQ and sex, and (2) between level of productive thinking performance and classroom environment as judged to facilitate creative thinking.

Otto, W. The relationship of reactive inhibition and school achievement: Theory, research, and implications. Occasional Paper No. 4. 8 pp. September 1966. ED 010 507.

Drawing on theory and existing research, Professor Otto examines the relationship of reactive inhibition to achievement in the basic school subjects. Within an underlying assumption that at least the early stages of basic skill learning take place by operant conditioning, inhibitory potential may be a potent determiner of later achievement.

Otto, W., & Askov, E. The role of color in learning and instruction. Theoretical Paper No. 12. 10 pp. March 1968. (Out of print) ED 021 697.

This paper reviews the existing research relating to the function of color in learning, examines the rationale for present applications of color in instructional materials, and considers the implications regarding the use of color as an aid to learning.

Otto, W., & Barrett, T. C. Two studies of children's ability to formulate and state a literal main idea in reading. Technical Report No. 57. 25 pp. June 1968. (Out of print) ED 024 543.

This report deals with two studies which investigate the ability of young children to formulate and state the main idea in a paragraph. A substantial portion of the report is devoted to methodological matters: operational definition of main idea, appropriate reading materials, and a method for evaluating responses.

Otto, W., & Cooper, C. Investigations of the role of selected cues in children's paired-associate learning. Technical Report No. 53. 20 pp. May 1968. (Out of print) ED 036 315.

Four studies in a series dealing with good and poor readers' utilization of selected cues in paired-associate learning are reported. Specific cues considered were color, order of presentation, and verbal mediators.

Otto, W., & Rarick, G. L. Effect of time of transition from manuscript to cursive writing upon subsequent performance in handwriting, spelling and reading. Technical Report No. 47. 11 pp. April 1968. (Out of print) ED 016 575.

This study was designed to determine whether the handwriting, reading, and spelling performance of fourth- and sixth-grade children is related to the time when the transition from manuscript to cursive writing is made.

Peters, N. A. Application of Jensen's bidimensional model of learning to the reading process. Technical Report No. 217. (Ph.D. dissertation) 56 pp. March 1972.

Both associative and conceptual learning are presumed to be of importance in reading at all developmental levels. However, it is hypothesized in the present study that there is a stronger relationship between beginning reading and Level I (associative) learning than between beginning reading and Level II (conceptual) learning. Conversely, it is hypothesized that there is a stronger relationship between later reading and Level II (conceptual) learning than between later reading and Level I (associative) learning.

A total of 108 subjects from Grades 2, 4, and 6 were used in the study. An equal representation of good, average, and poor readers at each grade level and for both sexes was obtained.

The essential findings of the study were that there is (a) no significant difference between the performances of good, average, and poor readers on a Level I (associative) learning task at the first-grade level; (b) no significant difference between the performance of good, average, and poor readers on a Level I (associative) and Level II (conceptual) learning task at the fourth-grade level; (c) no significant difference between the performances of good, average, and poor readers on a Level II (conceptual) learning task at the sixth-grade level; (d) no significant difference between the performance of boys and girls on Level I (associative) and Level II (conceptual) learning tasks.

Peterson, J. Effects of sex of experimenter and sex of subject in first and fifth grade children's paired-associate learning. Technical Report No. 136. (Ph.D. dissertation) 64 pp. June 1970. ED 043 085.

The predominant use of female teachers in the elementary school is one of the variables to which the inferior learning rates of males in elementary school has been attributed. The implication is that male teachers in the elementary school would foster the academic growth of young males.

In lieu of male teachers at the primary level, the present study was designed to determine the effect of the sex of the teacher/experimenter on the learning of a reading-like paired-associate task by children in two elementary school grades.

With particular limitations in mind, it was noted that the sex of the teacher per se will not differentially affect the academic performance of boys and girls if both sexes are given equal opportunities to participate in instruction.

Quilling, M., Cook, D. M., Wardrop, J. L., Klausmeier, H. J., Baldwin, R., & Loose, C. Research and development activities in R & I Units of two elementary schools of Milwaukee, Wisconsin, 1966-67. Technical Report No. 46. 17 pp. March 1968. (Out of print) ED 020 911.

Activities of R & I (Research and Instruction) Units in two Milwaukee schools during the 1966-67 school year are reviewed. Results of two controlled experiments conducted in the Units are reported and evaluated. In one study, although no significant difference was found between two methods of teaching fourth graders arithmetic, both groups of students made progress as great as or greater than their average rate of progress since entering school. First graders who had sixth-grade helpers in arithmetic performed significantly better than pupils who did not have helpers.

Ramsay, J. G. The attainment of concepts from figural and verbal instances, by individuals and pairs. Technical Report No. 4. (Master's thesis) 13 pp. January 1966. (Out of print) ED 010 204.

Mr. Ramsay investigated the effects of two types of material and four sequences of concept presentation on the concept-learning performance of individuals and pairs. Five dependent variables were used to assess performance.

Ramsay, J. G. Concept learning as a function of the type of material and type of classification. Technical Report No. 58. 26 pp. June 1968. ED 024 099.

This reports the effects of the number of relevant stimulus dimensions and figural versus verbal stimuli in the concept learning ability of college students. Results force a consideration of mediational variables in explaining this form of cognitive learning.

Romberg, T. A., Shepler, J. L., & Wilson, J. W. Three experiments involving probability measurement procedures with mathematics test items. Technical Report No. 129. 29 pp. June 1970. ED 044 315.

This Technical Report presents the results of three experiments designed to study the utility of probability measurement procedures with mathematics test items.

The first two studies used test items measuring high-level cognitive abilities with eleventh- and twelfth-grade students. The third used information items measuring low cognitive abilities with eighth-grade students.

Rudegeair, R. E. The effect of contextual influence on children's discrimination of initial consonants. Technical Report No. 146. (Ph.D. dissertation) 76 pp. September 1970. ED 047 307.

This study investigates whether or not modifications in the acoustic correlates of initial stops and fricatives due to the following vowel can affect phonemic decision processes. Two experiments were conducted to investigate contextual effects. In Experiment I, CV syllables comprised of stop plus a vowel were paired and presented to 36 first-grade subjects in a discrimination task. Experiment II differed from I only in that it involved fricatives instead of stops.

The results showed that the effects of coarticulation do affect discrimination probabilities.

Rudegeair, R. E., & Kamil, M. L. Assessment of phonological discrimination in children. Technical Report No. 118. 17 pp. March 1970. ED 043 679.

A review of the literature led the present investigators to conclude that conventional tests are inadequate for accurate assessment of phonological discrimination ability in children. To reduce task difficulty, the present investigators developed repeated contrast test pairs. Such pairs consist of CVC syllables in which the same phonemic contrast occurs twice (e.g., /bob/-/dod/).

The results have two major implications: First, repeated testing is a necessity for young children. Second, repeated contrast pairs may provide a means of obtaining a more complete assessment of phonological discrimination ability in children.

Saeman, R. A. Effects of commonly known meanings on determining obscure meanings of multiple-meaning words in context. Technical Report No. 148. (Ph.D. dissertation) 128 pp. September 1970. ED 050 087.

The primary purpose of the study was to determine whether more commonly known meanings of polysemantic words interfere with a child's use of semantic syntax to ascertain an appropriate obscure meaning in a sentence context. To achieve this general purpose, secondary purposes were defined: (1) to determine common and obscure meanings of multiple-meaning nouns, (2) to complete children's ability to use context to determine common meaning with their ability to use context to determine obscure meanings, (3) to ascertain whether error differences on common and obscure meanings were primarily attributable to both the lexical items which represent those meanings and the range of meanings for each item, and (4) to compare boys' and girls' ability in the use of context to determine whether this reading skill is better developed in young girls than young boys.

Schotanus, H. D. The relationship between difficulty of reading material and attitude toward reading. Technical Report No. 29. (Master's thesis) 14 pp. July 1967. ED 016 596.

A comparison between instructional reading level and difficulty level of reading materials selected by second graders for enjoyment was made. Previously determined attitudes toward reading were related to difficulty of chosen materials.

Schwenn, E. A., Sorenson, J. S., & Bavry, J. L. The effect of individual adult-child conferences on the independent reading of elementary school children. Technical Report No. 125. 18 pp. March 1970. ED 040 841.

This study was conducted to determine the effectiveness of individual adult-child conferences in increasing the independent reading of elementary school children. During an 8-week baseline period, data on the number and difficulty level of books read by students in three grades (2, 4, and 6) were gathered. Only students who ranked in the lower two-thirds on this measure were included in the sample. Students were stratified into two reading achievement levels (high, low).

Although the conferences significantly increased the amount of the children's independent reading, they had little effect on the difficulty level of their reading. Nor did the conference condition produce a differential gain in reading achievement. The lack of effect of the conferences on achievement test scores was probably due to the relative brevity of the experimental period.

Scott, J. A. *The effect of selected training experiences on performance on a test of conservation of numerousness*. Technical Report No. 92. (Master's thesis) 65 pp. July 1969. (Out of print) ED 036 334.

Eleven lessons were presented to kindergartners in an attempt to train them to identify properties of objects. It was concluded that such children can with little difficulty be taught to identify, discriminate, and label properties of objects and of sets of objects.

Scott, J. A. *The effects on short- and long-term retention and on transfer of two methods of presenting selected geometry concepts*. Technical Report No 138. (Ph.D. dissertation) 152 pp. July 1970. ED 044 314.

Expository and discovery methods of presenting geometry concepts to sixth graders were compared, and effects of retention were tested after 1, 11, and 21 days.

The findings indicated that the method of presentation differentially affected retention of material, as test scores of subjects taught in expository mode decreased over time, and those of the subjects taught in discovery mode increased over time. No differential effect on transfer or immediate acquisition was found from method of presentation.

Skeel, M. H., Calfee, R. C., & Venezky, R. L. *Perceptual confusions among fricatives in preschool children*. Technical Report No. 73. 11 pp. February 1969. ED 036 789.

This study examined perceptual and articulatory confusions among the fricatives /f, v, s, z, θ, ð/ in preschool children. These phonemes were selected because they are among the most difficult for children to articulate. Seventeen children between 3.3 and 5.1 years old were tested on syllables formed by taking all combinations of the 6 fricatives in initial (CV) and final (VC) position with one of the vowels /a, i, aɪ/. Discrimination and articulation tests of this syllable set were then administered.

Smith, R. J. *The effects of reading a short story for a creative purpose on student attitudes and writing*. Technical Report No. 28. (Ph.D. dissertation) 29 pp. July 1967. (Out of print) ED 017 437.

Twelfth graders in college preparatory English class completed either creative or non-creative writing tasks and responded to an inventory of attitudes relative to the stories and tasks. Half of the students had previously received training on the two types of writing tasks. The analysis treated attitudes, effects of training, and cognitive level of written product.

Smuckler, N. S. *Concept formation as a function of method of presentation and ratio of positive to negative instances*. Technical Report No. 27. (Master's thesis) 24 pp. June 1967. ED 015 779.

The effect of two methods of presentation (simultaneous and successive) and four ratios of positive and negative instances (100%, 75%, 50%, and 25% positive instances) upon concept acquisition, transfer, and retention were investigated with 80 second graders.

Sorenson, J. S., Schwenn, E. A., & Bavry, J. L. *The use of individual and group goal-setting conferences as a motivational device to improve student self-direction: A preliminary study*. Technical Report No. 123. 18 pp. March 1970. (Out of print) ED 039 621.

The purpose of this study was to describe the implementation of a school-wide system of individually guided motivation utilizing individual and group goal-setting conferences.

Before they were assigned to treatment groups, all students completed a self-assessment form on which they rated themselves on a set of 20 behaviors. Teachers from each unit, using a consensus method, also evaluated each student on the same set of 20 behaviors.

The principal and unit leaders indicated that they considered the conferences to be highly effective motivational devices.

Sowder, L. Discovery learning: A status study, Grades 4-7, and an examination of the influence of verbalizing mode on retention. Technical Report No. 99. (Ph.D. dissertation) 140 pp. July 1969. ED 035 593.

Aims of this study were twofold: (1) to explore the ability of pupils to give operational evidence of generalizing in selected numerical situations, and (2) to study the effects of differing manners of verbalizing a generalization on the retention of the ability to use the generalizations.

Sweet, R. C. Educational attainment and attitudes toward school as a function of feedback in the form of teachers' written comments. Technical Report No. 15. (Master's thesis) 12 pp. November 1966. ED 015 163.

The relationship between a teacher's written comments on a test and subsequent student attainment as measured by test performance has been partially established. Mr. Sweet reports a study further clarifying the relationship and examining the attitude change toward a school subject as a function of the teacher's comments.

Tatham, S. M. Reading comprehension of materials written with select oral language patterns: A study of Grades 2 and 4. Technical Report No. 86. (Ph.D. dissertation) 143 pp. July 1969. ED 036 405.

To determine whether or not second and fourth graders comprehend material written with oral language patterns that appear frequently in their speech better than material written with patterns that appear infrequently, two reading comprehension tests were devised.

Ting, A., Venezky, R. L., Chapman, R. S., & Calfee, R. C. Phonetic transcription: A study of transcriber variation. Technical Report No. 122. 18 pp. March 1970. ED 038 646.

This study examined variation in transcriber disagreement as a function of transcriber's linguistic background, the transcription task, and the nature of judgment involved. Three linguistics students trained in phonetic transcription, one a non-native speaker of English, listened to the same tapes of midwestern kindergartners pronouncing lists of common words.

The judgment of whether or not a sound in a word was mispronounced produced only half as many disagreements as the selection of a particular transcription for a sound thought to be in error by both transcribers.

Towson, S. M. Tutor role enactment in the peer teaching dyad: The effects of tutor-initiated tutee evaluation and reward. Technical Report No. 218. (Master's thesis) 37 pp. March 1972.

Forty-eight fifth-grade, third-grade same-sex pairs, half male and half female, met for five one-hour tutoring sessions on reading skills. Pairs were evenly divided among three conditions: (1) Evaluation-Reward, (2) Evaluation-No Reward, and (3) No Evaluation-No Reward.

Planned comparisons of pre- and post-experimental data indicated that tutors in the Evaluation-Reward condition were significantly less satisfied with tutoring than were tutors in the other two conditions. It was hypothesized that these results were due to the reluctance of the tutors to assume the dual responsibilities of both evaluating and rewarding their tutees.

Venezky, R. L. Letter naming and learning to read. Theoretical Paper No. 31. 14 pp. October 1971. ED 058 006.

For about 2000 years educators assumed without question that learning the letter names in their proper sequence was a prerequisite for literacy. Learning the ABC's became synonymous with learning to read. But today there is disagreement over the value of early letter-name training. Some claim that it aids letter or word discrimination; some claim that it aids attaching sounds to letters; and some claim that it interferes with both of these tasks. The purpose of this paper is to review this controversy through an analysis of the letter names, their application to the teaching of reading, and the experimental data offered for each viewpoint.

Venezky, R. L. The letter-sound generalizations of first, second, and third grade Finnish children. Technical Report No. 219. 9 pp. March 1972.

To find how well children learn letter-sound correspondences when an orthography is highly regular, and how this ability relates to socioeconomic status (SES) and to reading ability, 240 Finnish children were tested for letter-sound generalizations. The test consisted of 25 synthetic words, constructed to look like Finnish words and to contain the full range of correspondences which occur in Finnish orthography. Children from Grades 1 through 3, stratified by sex and by SES, were tested individually on the word list, with the pronunciation of each word being scored either right or wrong. An analysis of variance on the raw scores showed a significant grade effect at the .01 level, but no SES or sex effect. Mean correct, however, was almost 80% in Grade 1, indicating a surprisingly high level of letter-sound mastery. But the correlations of letter-sound ability with reading ability were only moderately high, ranging from .528 (Grade 2) to .487 (Grade 3). This result indicates that the ability to generalize letter-sound correspondences does not guarantee high ability in reading.

Venezky, R. L., & Johnson, D. The development of two letter-sound patterns in Grades 1-3. Technical Report No. 189. 9 pp. January 1972.

Tests for four letter-sound generalizations, c → [k], c → [s], a → [æ], and a → [e], were given to 73 first-, second-, and third-grade children at six-week intervals during a single school year. Each test included five synthetic words (e.g., cipe, acim, bice, cib, ocet) for each generalization. Children responded individually to the test items by attempting to pronounce each one aloud. The long and short pronunciations of a ([e] and [æ]) and the [k] pronunciation of c were learned to a high degree of accuracy and showed no significant differences across grade levels, but did differ significantly across ability groups, which were defined by scores on a standard reading test administered at the end of the school year. For c → [s], however, learning was extremely low at all grade levels and reached only 45% correct by the end of Grade 3. Initial c → [s] was learned more slowly than medial c → [s], indicating an interaction between letter pattern and word position. The failure to acquire the c → [s] pattern, especially in word-initial position, appears to result primarily from the failure of most beginning reading texts to include a sufficient sampling of words which begin with c before e, i, or y.

Weinstein, M. S. Effects of training on the concepts of water level and horizontality in the classroom. Technical Report No. 128. (Ph.D. dissertation) 83 pp. May 1970. ED 056 882.

The concepts of water level and horizontality are essential to the "coordinatization" of the plane. A sequence of training tasks was given to kindergarten, first, and second graders in a design involving pretest, posttest, and a nonequivalent control group. Results showed treatment effects to be significant but there was little differentiation between the two treatments, one of which used specific language labels, and the other generalized everyday language. All grades showed significant gains, but a definite grade effect was shown.

Weissglass, R. R. The effect of memory span on cue patterns in word recognition. Technical Report No. 16. (Master's thesis) 16 pp. December 1966. ED 015 111.

The possible effect of memory span on the cue patterns of young children and the effectiveness of memory span tests as predictors of difficulty in learning to read are reported. Kindergarten children, screened by scores on the WISC Digit Span subtest, selected from a group of five-letter nonsense words the one most similar to a word just shown them. Analysis treated all five position cues.

Wiles, C. A., Romberg, T. A., & Moser, J. A. The relative effectiveness of two different instructional sequences designed to teach the addition and subtraction algorithms. Technical Report No. 222. (In press)

WORKING PAPERS

Averhart, C. J. Effects of individual goal-setting conferences on goal-setting behavior, reading achievement, attitude toward reading, and self-esteem for second-grade students. Working Paper No. 71. 88 pp. June 1971.

The purpose of this study was to compare the effects of goal-setting conferences and conferences without goal-setting on goal-setting behavior, achievement, self-esteem, and attitude toward reading and reading skills. No significant differences were noted between treatment groups in terms of goal-setting behavior, self-esteem, or attitude toward reading.

Benzinger, T. L. The effects of instruction on the development of the concept of conservation of numerousness by kindergarten children. Working Paper No. 44. 43 pp. October 1970.

Forty kindergarten children at the Stephen Bull School in Racine, Wisconsin were tested to determine the effects of a sequence of 12 lessons on the ability of kindergarten children to recognize and conserve numerousness. The population, which consisted of low-to-middle socioeconomic level children, was divided into treatment and control groups. A test of numerousness served as pretest and posttest.

It was concluded that the lessons used in this experiment did not sufficiently enhance the subjects' ability to conserve numerousness, but that they should provide an effective supplement to formal activities with number concepts.

Frayer, D. A., Fredrick, W. C., & Klausmeier, H. J. A schema for testing the level of concept mastery. Working Paper No. 16. 32 pp. April 1969.

Classroom concept learning research requires the development of a measuring instrument which tests both nonverbal and verbal aspects of concept learning, permits differentiation of various aspects of concept mastery, and is applicable to various types of concepts. This schema consists of 13 behaviors from which concept learning may be inferred.

Gaa, J. P. Goal setting: Review of the literature and implications for future research. Working Paper No. 47. 29 pp. October 1970.

Laboratory research and initial studies of the effects of goal setting in the classroom indicate that goal setting increases achievement. Thus, goal setting may prove to be an effective motivational technique for use in the schools. Goal setting, however, is influenced by many factors such as knowledge of results, explicitness of goals, difficulty of goals, origin of goals, and monetary incentives. Research concerning the effects of these factors is reviewed to provide a basis for the development of classroom goal-setting procedures. Classroom studies dealing with conferences and with goal setting are also summarized. Suggestions are provided for research to delineate the effects of goal-setting variables in the classroom and for formative evaluation of goal-setting procedures.

Golub, L. S. A research-based development cycle for an oral and written language learning program, Grades K-6. Working Paper No. 35. 11 pp. February 1970.

This paper aims to: (1) outline the developmental cycle of an Oral and Written Language Learning Program, Grades K-6 and (2) to outline a strategy for determining the needs and objectives of this language learning program.

Johnson, S. L., & Fredrick, W. C. An analysis of a test of seventh grade structural grammar concepts taught in the English Language Arts in Wisconsin Curriculum. Working Paper No. 37. 21 pp. May 1970.

A 65-item test was developed to test the comprehension, interpretation, and application of concepts of structural grammar by seventh graders in the English Language Arts in Wisconsin Curriculum. Multiple-choice items were field tested with over 300 students. The increase in score from pretest to posttest was from 25.0 to 35.2, showing a statistically and conceptually significant amount of learning. The Hoyt internal consistency of the test as a posttest was high at .92. Several items were revised and suggestions for use of the test are given.

Kamil, M. L. Effects of parallel syntactic structures on immediate recall of compound sentences. Working Paper No. 19. 19 pp. May 1969. (Out of print)

Phase-structural variables have been shown to affect performance of Ss in handling sentences in a variety of psychological tasks. The present experiment was designed to point out another variable that substantially affects children's performance in immediate recall of sentences.

Sixty Ss with a mean age of 6 years and 9 months were each given one of the sets interspersed with 12 irrelevant sentences. Subjects were asked to repeat each sentence immediately after its presentation. The dependent variable was the number of words correctly repeated. Recall was found to increase significantly with increases in the Parallel Index. Two linguistic processing mechanisms were discussed as possible explanations for the results.

Lamal, P. A. A preliminary study of tutorial procedures in the elementary school. Working Paper No. 39. 87 pp. July 1970.

A study to determine what combinations of age and sex of tutor and tutee would result in optimum levels of tutee achievement found no significant effects due to change of these variables using fifth- and sixth-grade students aiding second- and third-grade students. Lack of significant effects is possibly due to insensitive dependent measures and lack of robustness of experimental treatment.

Levin, J. R. Strategies in reading comprehension: I. A test of a recent model. Working Paper No. 99. (In press)

Marten, B. J. The effects of information concerning the attributes of concept instances and recall of relevant subconcepts on the level of mastery of certain geometric concepts. Working Paper No. 45. 58 pp. September 1970.

The purpose of this study was to determine the effect of different types of instructions on the initial acquisition, retention, and delayed transfer of geometry concepts. Three sets of instructions were written with varying amounts of attribute information and recall of relevant information content. The instructions preceded five lessons in geometric concepts, given to sixth graders. The students were tested on their level of concept mastery immediately after the five sessions and 18 days later.

Otto, W., & Koenke, K. Scaling children's statements of the main idea in reading. Working Paper No. 31. 15 pp. January 1970.

In previous work designed to examine children's ability to formulate and state a main idea in reading, a troublesome task had been to devise means for scoring and/or categorizing main idea statements for purposes of description and analysis. The development and refinement of a descriptive and of a qualitative scale for use in the study of children's main idea statements are described in this paper. Results of tryouts of both scales are summarized. The salient conclusion is that scales for rating main idea statements can be used effectively in the classroom.

Powell, F., Askov, E., & Otto, W. Guidelines for self-directed, interpretive, and creative reading skills. Working Paper No. 42. Part 1, 105 pp. Part 2, 193 pp. August 1970.

Guidelines for skill development in areas of self-directed, interpretive, and creative reading are proposed. Included are suggestions of activities, materials, and methods of assessment for guiding reading skill development in each of the three areas.

Scott, J. A., & Frayer, D. A. Learning by discovery: A review of the research methodology. Working Paper No. 64. 31 pp. December 1970.

Research comparing discovery and expository methods of presentation has yielded conflicting results. A review of the research on discovery learning is provided in this paper, focusing on the methodology of each study. Conclusions are drawn concerning the effects of discovery methods of presentation on initial learning, transfer, and retention. Use of a standardized concept learning task is recommended for future research on discovery methods of presentation.

Venezky, R. L. Linguistics and spelling. Working Paper No. 15. 16 pp. April 1969.

The linguist can provide for educators data on the pronunciation of a language; however, as a linguist, he cannot decide if and how they should be deployed in the teaching of spelling.

Venezky, R. L. Non-standard language and reading. Working Paper No. 43. 31 pp. September 1970.

This report discusses the problems encountered in learning to read in the American school system by children who do not speak a standard brand of English. It discusses approaches for teaching reading to speakers of non-standard English, with special emphasis on the initial reading process and the language or dialect of the reading materials.

Venezky, R. L., & Calfee, R. C. Models for the reading process. Working Paper No. 38. 39 pp. June 1970.

A model for the reading process is proposed which includes high-speed visual scanning, dual processing, and searching for the largest manageable units (LMU). During reading, two processes take place in parallel: syntactic-semantic integration of what has just been scanned and forward scanning to locate the next LMU.

Implicit in this model are several hypotheses about reading. Procedures are suggested for testing these and other components of the model.

Webb, J. M. Hello from merrie England. Working Paper No. 66. 118 pp. February 1971.

This report provides a first-hand account of the impressions and reactions of an American elementary school teacher to English efforts with respect to activity learning in mathematics.

TECHNICAL MEMO

Romberg, T. A., & Wiles, C. A. Item-sampling—a non-reactive data gathering procedure for formative evaluations. Technical Memo T-72-1. 1972.

Component R3
Organization for Instruction and Administrative Arrangements

Organizational—Individual Articulation Within Multiunit Schools

Axiomatic Organizational Processes in Multiunit School Districts

Cost-Effectiveness and Productivity

Role of the Specialist Teacher in the Multiunit School

Principal Investigators:
  James M. Lipham, Department of Educational Administration
  Richard A. Rossmiller, Department of Educational Administration
  Robert Petzold, Department of Curriculum and Instruction

This new research component is transferred from Program 3: Facilitative Environments.

Klausmeier, H. J., Quilling, M. R., & Sorenson, J. S. The development and evaluation of the multiunit elementary school, 1966-1970. Technical Report No. 158. 16 pp. March 1971. ED 051 589.

A system of individually guided education (IGE) has been developed at the elementary school level. The IGE system eliminates many ineffective practices that have survived throughout the past decades. The IGE system has seven components, one of which is new organizational/administrative arrangements, together called the "Multiunit Elementary School (MUS-E)." These new arrangements are the instruction and research unit at the classroom level (I&R unit), the instructional improvement committee at the building level (IIC), and the system-wide policy committee at the system level (SPC). The MUS-E emerged since 1965 from a synthesis of theory and practice regarding instructional programming for the individual student, horizontal and vertical organization for instruction, role differentiation, shared decision making, and open communication.

Since 1965-1966, 164 MUS-Es have been formed and there has been continuous evaluation of the effects of IGE. The organizational/administrative specifications dealing with specialization of tasks, cooperative planning and open communication among teachers and administrators, decision making at appropriate levels in the school system, high morale and job satisfaction among teachers, non-grading and continuous progress of students, and related phenomena have been met. Higher student achievement is occurring where the curriculum component in reading has been incorporated into smooth functioning MUS-Es. Early evaluation results indicate support of the hypothesis that children in the sixth year of schooling in an IGE/MUS-E school will achieve as high as did children of the same school in seven years prior to adoption of the IGE system.

Klausmeier, H. J., Quilling, M. R., Sorenson, J. S., Way, R. S., & Glasrud, G. R. Individually Guided Education and the Multiunit Elementary School: Guidelines for Implementation. Madison: Wisconsin Research and Development Center for Cognitive Learning, 1971. 132 pp. ($2.00).

Development Components

Component D1
Developing Mathematical Processes

Principal Investigators:
Thomas A. Romberg, Department of Curriculum and Instruction
John G. Harvey, Department of Mathematics

Associate Scientist:	Assistant Scientist:
James M. Moser	Mary E. Montgomery

King, I. L. A formative development of a unit on proof for use in the elementary school. Technical Report No. 111. (Ph.D. dissertation) 393 pp. in 3 vols. January 1970. ED 040 876.

To test the feasibility of presenting proof materials to college-capable sixth-grade students, a unit on mathematical proof was developed using an iterative procedure. Formative evaluation procedures were used to improve various components of the unit. The iterative developmental procedures employed in developing the unit were highly successful; sixth-grade students are able to understand and prove the mathematical proofs as presented in the unit.

Meyer, R. W. The identification and encouragement of mathematical creativity in first grade students. Technical Report No. 112. (Ph.D. dissertation) 236 pp. in 3 vols. January 1970. ED 038 292 No. 1. ED 038 293 No. 2. ED 038 294 No. 3.

One set of conditions conducive to mathematical creativity was proposed and activities which satisfy these conditions were piloted. From these activities both an instructional program to encourage individual mathematical creativity in first-grade students and two problems to use as part of the test instrument were developed. An experiment was conducted to determine the effects of participation in the program on observable mathematical creativity. The effects on general creativity were measured using the Torrance Tests of Creative Thinking, Figural Forms A and B. Evidence revealed that under suitable conditions, first-grade students can exhibit behaviors satisfying these criteria.

Romberg, T. A., Shepler, J., & King, I. L. Mastery learning and retention. Technical Report No. 151. 15 pp. December 1970. ED 046 037.

This paper reports the results of two retention studies. In each study tests were given some time after instruction to a class of students whose initial level of performance was quite high. For the first study on retention of probability concepts, the correlation between achievement scores immediately after learning and those obtained 4 weeks later was .78. For the second study on recall of mathematical proofs the correlation between achievement scores immediately after learning and those obtained 2 weeks later was .75. The results indicate that high initial performance may contribute to high retention.

Shepler, J. L. A study of parts of the development of a unit in probability and statistics for the elementary school. Technical Report No. 105. (Ph.D. dissertation) 410 pp. in 4 vols. November 1969. (Out of print) ED 038 302 No. 1. ED 038 303 No. 2. ED 038 304 No. 3. ED 038 305 No. 4.

The behavioral objectives for a unit of instruction in probability and statistics for sixth-grade students and the order in which objectives would be taught were determined. An instructional analysis of the unit was undertaken to select or develop materials and procedures for teaching the unit.

Shepler, J. L. An exploratory study of the interaction of three elementary concepts of probability with stimuli, socioenomic, grade, and IQ differences. Technical Report No. 114. 45 pp. March 1970. ED 045 414.

This status study provides evidence supporting the feasibility of teaching certain probability concepts to at least 30 fifth- and sixth-grade students. The study employed an interview technique to analyze the status of three basic concepts of probability (sample space, probability of an event, choosing the most [equally] likely of two events) and measured the effects of visual aids on the child's ability to solve problems involving these concepts.

Stewart, D. M. Development of a group test of arithmetic achievement for Developing Mathematical Processes, Arithmetic, Book I. Technical Report No. 140. (Master's thesis) August 1970. ED 047 979.

Constructing a group-administered test of kindergarten and first-grade children's knowledge of the content of Developing Mathematical Processes, Arithmetic, Book I was the purpose of this study. From the list of behavioral objectives for Book I, 15 were selected as ones whose attainment could be measured in a group paper-and-pencil tests. Eight item prototypes were developed from which the 171 items tried out were generated. Items were compiled into seven tests (booklets), each of which was administered to approximately 40 children.

WORKING PAPERS

Harvey, J. G. The content of arithmetic included in a modern elementary mathematics program. Working Paper No. 79. 39 pp. October 1971.

This paper details the arithmetic topics proposed for inclusion in a modern elementary mathematics program, gives a rationale for the selection of these topics, and discusses the sequencing of the topics.

Harvey, J. G., Green, M., & McLeod, D. B. The task analysis for Developing Mathematical Processes, Arithmetic, Book 3: Writing Mathematical Sentences Using Larger Numbers and Arithmetic, Book 4: The Integers. Working Paper No. 100. (In press)

Harvey, J. G., McLeod, D. B., & Romberg, T. A. The task analysis for Developing Mathematical Processes, Arithmetic, Book 2: Writing Mathematical Sentences. Working Paper No. 49. 14 pp. November 1970.

This paper presents the task analysis for Developing Mathematical Processes, Arithmetic, Book 2: Writing Mathematical Sentences. The sequence of instructions chosen for the book is also outlined.

Harvey, J. G., Meyer, R. W., Romberg, T. A., & Fletcher, H. J. The content of geometry for the elementary school. Working Paper No. 28. 19 pp. December 1969.

A rationale for including geometry in the elementary school mathematics curriculum is developed. The content outline lists topics separately for three levels—K-2, 3-4, and 5-6—in each of five areas—location geometry, nonmetric geometry, metric geometry, transformational geometry, and geometric problem solving.

Romberg, T. A., Fletcher, H. J., & Scott, J. A. A measurement approach to elementary mathematics instruction. Working Paper No. 12. 8 pp. December 1968. (Out of print)

The problem attacked in this project is to design an instructional system to facilitate the interaction of children with mathematics.

Romberg, T. A., & Gornowicz, C. J. Developing Mathematical Processes: Prototypic tryout of materials for kindergarten children, Huegel School, 1968-69, Madison, Wisconsin. Working Paper No. 32. 24 pp. February 1970.

This paper summarizes the developmental activities in mathematics conducted in kindergarten at Ray W. Huegel School, Madison, Wisconsin, during the 1968-69 school year. One instructional unit of Developing Mathematical Processes was taught for kindergarten.

Romberg, T. A., & Harvey, J. G. Developing Mathematical Processes: Background and projections. Working Paper No. 14. 24 pp. April 1969. (Out of print)

Preliminary activities in this paper include identifying instructional objectives, student activities, materials, and assessment procedures for integration into a total mathematics curriculum.

Romberg, T. A., Harvey, J. G., & McLeod, D. B. The task analysis for Developing Mathematical Processes, Arithmetic, Book I: Comparing and equalizing objects and sets. Working Paper No. 48. 16 pp. November 1970.

This paper represents the task analysis for Developing Mathematical Processes, Arithmetic, Book I: Comparing and equalizing objects and sets. The major components of the task analysis can be described in terms of five areas—Description and Classification of Sets and Objects, Comparison of Objects on Continuous Properties, Comparison of Discrete Sets on the Property of Numerousness, Ordering and Equalizing Objects and Sets, and Counting and Writing Numerals.

Romberg, T. A., McLeod, D. B., & Montgomery, M. E. Blueprint for the Developing Mathematical Processes implementation program. Working Paper No. 74. 51 pp. August 1971.

This paper outlines the Developing Mathematical Processes implementation program. The components of this program include primarily materials and conferences for teachers and inservice coordinators. Plans for developing and evaluating the various components are specified. The appendix reviews the related research and applies the results to the implementation program.

Romberg, T. A., & Planert, D. Developing Mathematical Processes: Pilot tryout of materials for second grade children, Huegel School, 1968-69, Madison, Wisconsin. Working Paper No. 46. 41 pp. October 1970.

This paper summarized the developmental activities in mathematics conducted in the second grade at Ray W. Huegel School, Madison, Wisconsin, during the 1968-69 school year. One instructional unit of Developing Mathematical Processes was taught. The instructional unit is characterized through a description of the activities that were tried, an explanation of evaluation procedures, and a report of the results of each evaluation.

Romberg, T. A., & Planert, D. Developing Mathematical Processes: Prototypic tryout of materials for first grade children, Huegel School, 1968-69, Madison, Wisconsin. Working Paper No. 61. 34 pp. December 1970.

This paper summarizes the developmental activities in mathematics conducted in first grade at Ray W. Huegel School, Madison, Wisconsin, during the 1968-69 school year. Two instructional units of Developing Mathematical Processes were taught. The instructional units are described through a report of the activities that were tried, an explanation of evaluation procedures, and the results of each evaluation.

Romberg, T. A., & Roweton, M. Pilot developmental activities in elementary mathematics conducted at Huegel School, Madison, Wisconsin, 1967-68. Working Paper No. 24. 41 pp. October 1969.

Two instructional units were developed for kindergarten and five units for first year. Each instructional unit is described in this paper. An explanation of evaluation procedures and a report of the results of each evaluation are given.

Component D2
Elementary Science: Man and the Environment

Component Director:
Mary R. Quilling

Principal Investigator:
Alan M. Voelker, Department of Curriculum and Instruction

This developmental component is an extension of former Project 203.

Boles, R. J. The feasibility of teaching biology via the sociohistorical approach. Technical Report No. 66. 34 pp. November 1968.

The exploratory study described in this technical report was an attempt to determine the feasibility of teaching science concepts to high school students through instruction on the relationship of science and society or the social implications of science.

Carey, R. L. Lesson plans and tests of knowledge, comprehension, and application for selected concepts of the conceptual scheme "The Particle Nature of Matter." Practical Paper No. 1. 39 pp. January 1968. (Out of print)

These materials were developed for use in an empirical study to determine the relative levels of understanding of certain concepts within the conceptual scheme "The Particle Nature of Matter" achieved by pupils in Grades 2-5.

Carey, R. L. Relationship between levels of maturity and levels of understanding of selected concepts of "The Particle Nature of Matter." Technical Report No. 36. 68 pp. January 1968. (Out of print) ED 020 131.

The purpose of this study was to determine the relative levels of understanding of certain concepts achieved by pupils in Grades 2-5. Sixteen concepts were selected and ordered with reference to the logic of the discipline.

Helgeson, S. L. Lesson plans and tests of knowledge, comprehension, and application for instruction in concepts of force, Grades 2-6. Practical Paper No. 4. 39 pp. March 1968. ED 020 907.

The study for which the lessons and tests in this practical paper were developed indicated that pupils in Grades 2-6 are able to learn, at varying levels of understanding, selected concepts of force.

Helgeson, S. L. The relationship between concepts of force attained and maturity as indicated by grade levels. Technical Report No. 43. 43 pp. March 1968. ED 020 910.

Demonstration-discussion techniques were utilized to instruct pupils in Grades 2-6 in concepts related to the conceptual scheme of force. Lesson plans and tests utilized in this study are available in Practical Paper No. 4.

Pella, M. O., Green, R. A., Doran, R., & Roy, R. Teaching the conceptual scheme "The Particle Nature of Matter" in the elementary school. Technical Report No. 173, issued with accompanying Practical Paper, Classroom materials for teaching "The Particle Nature of Matter." 59 pp. and 209 pp. July 1971.

The purpose of this project was to develop a series of lessons and associated materials (tests, demonstrations, pupil activities, etc.) related to teaching concepts included in the scheme "The Particle Nature of Matter" for Grades 2 through 6. The hypothesis that served as the base for development is "theoretical concepts related to the particle nature of matter can be learned by pupils in Grades 2 through 6 when analogous mechanical models comprehensible to pupils of these ages are employed." The intent was to present abstract ideas in concrete terms.

The usability of the materials and strategies and the feasibility of teaching the concepts were judged against criteria including pre- and posttest scores of experimental and control groups, teacher opinions, and pupil opinions. The criteria were met by essentially all concepts at all grade levels. The hypothesis appears to possess some credibility and the materials developed are usable in the hands of regular classroom teachers. Pupils in Grades 2 through 6 appear to be interested in learning the particle theory of matter and in participating in theory development using analogous mechanical models.

The practical paper presents the lesson plans and tests used in the research study, together with descriptions of models and films developed for the teaching program.

Pella, M. O., & Ziegler, R. E. The use of static and dynamic models in teaching aspects of the theoretical concept "The Particle Nature of Matter." Technical Report No. 20. 50 pp. March 1967. (Out of print) ED 013 205.

Through the use of mechanical models a basic concept of science, "The Particle Nature of Matter," was effectively taught to children in Grades 2-6. The relationships of IQ, grade level, age, and past achievement in science and mathematics were ascertained through analysis of responses to eight test demonstrations given after instruction.

Roth, R. E., Pella, M. O., & Schoenfeld, C. A. Environmental management concepts—a list. Technical Report No. 126. 72 pp. April 1970. ED 045 376.

A survey to validate environmental management education concepts discovered no clear-cut bias evident due to either professional area or ecological region. Individual differences of opinion were found among the scholars in the survey from 40 professional areas and 12 ecological regions of the United States, although they agreed on the majority of concepts to be emphasized in environmental management education.

Sherman, J. E. The relative effectiveness of two methods of utilizing laboratory-type activities in teaching introductory physical science. Technical Report No. 65. 29 pp. November 1968. (Out of print)

This study was concereed with determining the relative effectiveness of a direct manipulative and an indirect nonmanipulative method of utilizing laboratory-type activities in teaching the course Introductory Physical Science (IPS).

Stauss, N. G. Materials used in teaching and evaluating the concepts related to the biological cell in Grades 2-6. Practical Paper No. 2. 36 pp. January 1968. ED 020 152.

The focus of this study was the identification of the concepts included within the conceptual scheme "The Biological Cell" most appropriate for study by children in Grades 2-6. For an investigation into children's learning of these concepts, lessons and tests were developed.

Stauss, N. G. An investigation into the relationship between concept attainment and level of maturity. Technical Report No. 40. 65 pp. February 1968. (Out of print) ED 020 152.

The focus of this study was the identification of the concepts included within the conceptual scheme "The Biological Cell" most appropriate for study by children in Grades 2-6. The grades in which satisfactory mastery of 11 specific concepts was attained are outlined.

Swartney, I. J. Learning difficulties encountered by students studying the CHEM study program. Technical Report No. 77. (Ph.D. dissertation) 101 pp. February 1969. (Out of print) ED 036 445.

This study was designed to identify those science concepts and mathematical skills that may be the source of student difficulty in learning chemistry as described by the CHEM study program.

Thompson, B. E. A list of currently credible biology concepts judged by a national panel to be important for inclusion in K-12 curricula. Technical Report No. 145. (Ph.D. dissertation) 338 pp. in 3 vols. September 1970. ED 048 006.

The primary purpose of this study was to construct a list of currently credible biology concepts judged to be important for inclusion in K-12 curricula by a national panel of biologists, science educators, and high school biology teachers.

An initial list was created by asking a panel composed of University of Wisconsin biologists to list the five to seven most important concepts to which a student should be exposed. After compilation and reassessment a list of 114 concepts was presented to the national panel of 387.

All three groups of the national panel were similar in their rating and ranking of the 114 biology concepts; thus the utilization of university scientists was a successful method of creating a current, credible list of concepts.

Triezenberg, H. J. Testing for concepts of ecological systems. Practical Paper No. 3. 19 pp. January 1968. ED 020 906.

This paper contains a pretest on equilibrium and posttests of knowledge, comprehension, and application of concepts of ecological systems. The tests are a part of a study conducted at junior high school level.

Triezenberg, H. J. The use of an advance organizer in teaching selected concepts of ecological systems. Technical Report No. 42. 43 pp. February 1968. ED 020 909.

Nine televised lessons on ecological systems were presented to students in Grades 7 and 9 following presentation of an organizer at three levels of abstraction—verbal, sketch, and mechanical model.

Voelker, A. M. The relative effectiveness of two methods of instruction in teaching the classificational concepts of physical and chemical change to elementary school children. Technical Report No. 39. 37 pp. February 1968. (Out of print) ED 020 908.

Through teacher-directed demonstration-discussion, students in Grades 2-6 were instructed in the concepts of physical and chemical change; responsibility for formulating and stating the generalization for proper classification of the phenomena rested with the learner in one treatment and with the teacher in another.

WORKING PAPERS

Voelker, A. M. Environmental education in the elementary school: Needs and specifications. Working Paper No. 40. 31 pp. July 1970.

This paper presents a description of needs and specifications for research and development activities in elementary-school science. Consideration is given to the current and future needs of the child and the society of which he is a member. An overview of deficiencies in current practice is followed by a plan for development and related research activities which will provide an environmental education for elementary-school children. Several alternatives for developing materials in this area of environmental education are described; strengths and weaknesses of each are indicated. A developmental sequence is detailed for one alternative, environmental readers.

Voelker, A. M. Content and specifications for Man from M.A.N. (Environmental Reader No. 1—Land Use). Working Paper No. 87. (In press)

Voelker, A. M. Content and specifications for Benjie Loses a Friend (Environmental Reader No. 2—Water Pollution). Working Paper No. 88. (In press)

Component D3
Wisconsin Design for Reading Skill Development

Principal Investigator:
Wayne R. Otto, Department of Curriculum and Instruction

Assistant Scientist:
Robert D. Chester

Ellison, M. L. Compendium of reading materials and teaching techniques for the Wisconsin Prototypic System of Reading Instruction. Practical Paper No. 7. 51 pp. February 1969. (Out of print)

The materials and techniques listed in the compendium were selected on the basis of practicality rather than a particular philosophy of reading instruction. At this stage of development the compendium should be considered a prototype. It needs to be tested for its usability and practicality for teachers in an elementary-school setting.

Otto, W. Overview of the Wisconsin Prototypic System of Reading Instruction in the Elementary School. Practical Paper No. 5. 68 pp. August 1968. (Out of print) ED 024 541.

This prototypic reading guide provides a framework for individually guided instruction in reading and is useful for individual diagnosis and for simplifying and guiding group procedures. (It is a revision of Working Paper No. 7.)

Otto, W., Houston, C., & Askov, E. (Eds.) Reading and the culturally disadvantaged: Selected papers from the annual Institute in Reading, 1966. Theoretical Paper No. 10. 19 pp. December 1967. (Out of print)

This paper includes talks by A. J. Harris and R. A. McMenemy and a discussion by Doris M. Cook and Ruth W. Baldwin. Certain ideas recurred, among them the recognition that the child from a deprived environment comes to school with several strikes against him and that attempts to help must come in preschool programs.

WORKING PAPERS

Askov, E. N. An instrument for assessing teachers' attitudes toward individualizing reading instruction. Working Paper No. 65. 29 pp. January 1971.

The development of an instrument for measuring teachers' attitudes toward individualizing reading instruction is described. The instrument was constructed in the semantic differential format, chosen as an indirect means of assessing attitudes. Teachers were asked to respond anonymously on adjective scales to 11 examples of classroom procedures. The examples were designed to be applications of the assumptions of individualized reading instruction. Reliability of the instrument was high (.93); content validity was demonstrated for the classroom examples and adjectives used in the instrument. Two validation studies which established the effectiveness of the instrument in discriminating among teachers' attitudes toward individualizing reading instruction are also reported.

Askov, E. N. A study of the Wisconsin Design for Reading Skill Development through a case history approach. Working Paper No. 68. 47 pp. March 1971.

Classroom observations of 12 children were made by clerical aides during reading instruction to determine the effects of the Wisconsin Design for Reading Skill Development upon individual children. One subject in each of the high, average, and low IQ groups was selected from each of four units. Data were analyzed by unit and IQ groups in terms of the proportion of time observed in various activities, group sizes, skill areas, skill levels, and modeling situations. The extent of skill group instruction and the average number of teachers instructing each child were also calculated.

Askov, E., & Otto, W. An analysis of the Wisconsin Design for Reading Skill Development. Working Paper No. 70. 128 pp. June 1971.

An analysis of the Wisconsin Design for Reading Skill Development is made through the use of the Recommendations for Curriculum and Instructional Materials of Louise Tyler and Frances Klein (1971). Each recommendation is stated followed by a discussion of the Design in relation to each recommendation.

Davis, M. L., Otto, W., & Peterson, J. (Eds.) Individual Assessment Exercises for the Wisconsin Prototypic System of Reading Skill Development. Working Paper No. 27. 181 pp. in three vols. August 1969.

The main purpose of this paper is to present a revision of the Individual Assessment Exercises, the original assessment component of the Wisconsin Prototypic System of Reading Skill Development. A prefatory statement reviews the background and evolution of these exercises and provides a working framework for use in the classroom.

Otto, W. The Wisconsin Prototypic System of Reading Skill Development: An interim report. Working Paper No. 26. 40 pp. August 1969. (Out of print)

This paper is an interim report on the Wisconsin Prototypic System of Reading Skill Development. Developmental activities prior to and projections for activities subsequent to summer, 1969, are described. The first portion of the paper is devoted to an overview of the system: Guidelines for the development of the system are given, followed by a recapitulation of general developmental activities. Components of the system, their development, and anticipated extensions and revisions are described. In the remainder of the paper implementation of the system is considered. Functions of the system and some tentative suggestions for implementation are given. Field experiences and anticipated field tests of the system are described.

Otto, W. Guides to informal individual skill observation for Word Attack. Report from the Reading Project. Working Paper No. 41. 135 pp. August 1970.

This paper is a revised version of Working Paper No. 27, Part I. Included are informal exercises that may be used to assess the skill development progress of individual children.

Otto, W. & Askov, E. N. The assessment of specific reading skills. Working Paper No. 69. 20 pp. April 1971.

This paper represents an attempt to place skill assessment in reading in perspective by viewing a larger context. First, skill assessment is considered in a general framework designed to facilitate instruction. Second, a prototype skill development system—the Wisconsin Design for Reading Skill Development—is described. And finally, preliminary empirical evidence is presented in support of a skill development focus in reading instruction. The empirical support is given in terms of (a) success in describing and assessing behaviors related to specific reading skills, (b) teachers' experience in setting and attaining goals in reading skill development, and (c) impact of implementing the Design on independent measures of reading performance.

Otto, W., & Ford, D. With the assistance of Eunice Nicholson. Materials for teaching adults to read. Working Paper No. 2. 46 pp. December 1966. ED 015 180.

Following a brief introduction which describes an extensive survey and review of the materials available for teaching illiterate adults to read, 23 basic reading programs for adults are described and evaluated through a 50-item check list. Five additional lists of supplementary materials and publications useful in literacy instruction follow the evaluation.

Otto, W., & Houston, C. Mechanical aids in the teaching of reading. Working Paper No. 3. 16 pp. January 1967. ED 015 190.

An overview of the functions of the primary types of reading instruction devices and of criticism and research related to their use is given. Prototypical devices of three types are reviewed—tachistoscopes, accelerators and pacers, and multimedia presentations. Photographs of 18 of the 22 devices reviewed are given.

Otto, W., Kamm, K., & Weible, E. Wisconsin Design for Reading Skill Development: Rationale and objectives for the Study Skills element. Working Paper No. 84. 103 pp. February 1972.

Essential skills and objectives for the Study Skills element of the Wisconsin Design for Reading Skill Development are presented. Three major subareas—maps, graphs, and reference—and several substrands for each are identified. Sources consulted and a rationale for choosing specific skills are given.

Otto, W., & Peterson, J. A statement of skills and objectives for the Wisconsin Prototypic System of Reading Skill Development. Working Paper No. 23. 68 pp. August 1969.

The purposes of this paper are (a) to present a revision of the Outline of Reading Skills and (b) to present statements of objectives for the areas of word attack skills, comprehension skills, and study skills.

Otto, W., Saeman, R., Houston, C., McMahan, B., & Wojtal, P. Prototypic guide to reading skill development in the elementary school. Working Paper No. 7. 44 pp. July 1967. (Out of print) ED 016 573.

This guide is intended to serve as the nucleus for a comprehensive program of reading instruction in the elementary school by providing an explicit statement of skills to be taught and model exercises and observations for assessing mastery of these skills.

TECHNICAL MEMOS

Fischbach, T., Harris, M., & Quilling, M. Interim evaluation of Wisconsin Tests of Reading Skill Development. Technical Memo No. T-70-1, January 1970.

Quilling, M. R. The first field test of the Word Attack Element of the Wisconsin Design for Reading Skill Development. Technical Memo No. QV-10-70, January 1971.

Component D4
Prereading Skills

Principal Investigator:
Richard L. Venezky, Department of Computer Sciences

Alexander, E. M. Task and intra-task differences in vocabulary performance. Technical Report No. 186. (Master's thesis) 76 pp. December 1971.

Two vocabulary tasks—one production and one recognition—were compared with the expectation that the recognition task would yield better performance than the production task. The pairs of pictures used in the recognition task were divided into eight groups defined on target and distractor frequency and same-different conceptual category membership with the exception that these groups would differ in relative error rate. Not only was the task difference confirmed, but evidence of considerable variability between test items was found, with a particularly significant effect involving category relationship.

Calfee, R. C., Chapman, R. S., & Venezky, R. L. How a child needs to think to learn to read. Technical Report No. 131. 41 pp. July 1970. ED 046 627.

This report summarizes 1968-69 studies of component prereading skills of kindergartners. Working from the assumption that independent component skills might exist, four skill areas were selected for investigation on the basis of literature findings and a decoding model of reading: visual, acoustic-phonetic, letter-sound association, and vocabulary skills. A research strategy is presented for the development and validation of assessment tests in each area and the subsequent development and validation of training procedures. The research reported here is concerned with skill assessment in each of the areas.

Calfee, R. C., & Venezky, R. L. Component skills in beginning reading. Technical Report No. 60. 14 pp. July 1968.

This paper raises the question: What skills are required by current reading tests? The makeup of test items is such that ability to follow instructions and general language competence are common factors which enter significantly into performance on all subtests. The task of constructing tests to identify separable skills in language and intelligence is possible but difficult.

Chapman, R. S. Report on the Fall 1970 version of the Wisconsin Basic Prereading Skill Test. Technical Report No. 179. 27 pp. August 1971.

This report summarizes the findings of a Fall 1970 administration of the Wisconsin Basic Prereading Skill Test to 162 entering kindergartners. The test is being developed to diagnose prereading skill deficits in kindergartners and to predict end-of-first-grade reading achievement. Included in the Fall administration were subtests for attending to letter order, letter orientation, and letter-string detail, and for segmenting sound sequences. A test for letter-naming ability was included for comparison to previous versions of the test, but will not be retained in the final version. Results are presented and the implications for test revision discussed.

Chapman, R. S. Report on the February 1971 version of the Wisconsin Basic Prereading Skill Test. Technical Report No. 187. 52 pp. December 1971.

This report summarizes the findings of a February 1971 administration of a revised and expanded version of the Wisconsin Basic Prereading Skill Test to 138 kindergartners. The test battery being developed has two purposes: (a) the identification of prereading skill deficits in kindergartners for individualized curriculum planning, and (b) the prediction of reading achievement at the end of first grade.

Included in the February 1971 test battery were visual tests for attending to letter orientation, letter-string order, and letter-string detail; auditory tests for sound matching and sound blending; and learning-rate tests for picture-sound association and word segmentation. For background information a letter-naming test was also included. Data were gathered on two forms of each visual test by testing a child on the complete test battery one day and the alternate forms of the visual tests the preceding or following day. Item analyses, test reliabilities, test correlations, and descriptive statistics are reported for the test battery. Implications for further test revision are discussed.

Venezky, R. L. Language and cognition in reading. Technical Report No. 188. 32 pp. January 1972.

The preliterate child must acquire from reading instruction at least the following skills: (a) appropriate scanning behavior, (b) letter and word recognition, (c) letter-sound generalizations, and (d) comprehension of written materials, at least to the degree that the reader can comprehend the same message when received aurally.

Almost all modern methods for teaching reading include letter-sound learning somewhere in the teaching sequence, although the amount and exact placement of this training account for the central disagreement between methods. Classroom comparisons of different teaching methods have contributed little to a general understanding of reading pedagogy, while more closely controlled laboratory experiments have not been able to simulate the complex interactions of variables which characterize the classroom. A more valid experimental procedure might be to work with existing (or new) programs, altering small, discrete segments of the materials and methods, and measuring marginal gain. In this way critical components of an instructional program could be isolated and examined *in situ*. This is, in essence, what Piaget has advocated under the title "experimental pedagogy."

WORKING PAPERS

Venezky, R. L., Calfee, R. C., & Chapman, R. S. Skills required for learning to read: A preliminary analysis. Working Paper No. 10. 18 pp. September 1968.

Three classes of skills required in the initial stages of learning to read are task skills, oral language skills, and letter-sound decoding skills. In this paper, competence in these skill areas is discussed in relation to instruction and assessment.

Venezky, R. L., & Chapman, R. S. An instructional program in prereading skills: Needs and specifications. Working Paper No. 78. 55 pp. September 1970.

This working paper presents the background, justification, and development plan for a kindergarten program to identify and correct deficits in prereading skills. The program provides for individual differences in: (a) patterns of skill deficits, (b) rates of learning, and (c) degrees of assistance required. It is intended for optimal use in the multiunit elementary school organization, permitting the planning of individually guided instruction with flexible groupings of staff and students; it is adaptable, however, to a variety of other school organizations. A three-year research and development plan incorporating pilot and small-scale field testing is proposed. At the end of that period, a full-year program would be ready for large-scale field testing.

Venezky, R. L., Chapman, R. S., Seegal, J., Kamm, M., & Leslie, R. The Prereading Skills Program: Evaluation of the first tryout. Working Paper No. 81. 73 pp. December 1971.

In spring of 1971, an initial version of a program to teach selected prereading skills was tried out in three kindergartens. The three visual skills to be taught by the program were attending to letter order, letter orientation, and word detail. The sound skills to be taught were sound matching and sound blending.

The program materials for children consisted of whole group, small group, and individual games and activities designed to teach the selected skills. The teacher was provided with a manual describing the games and the suggested scheduling, grouping, and assessment procedures.

This working paper summarizes the conditions of the tryout, describes and evaluates the program components in detail, and suggests revisions for the 1971-72 full-year testing of the program.

Component D5
A System of Individually Guided Motivation

Principal Investigator:
Herbert J. Klausmeier, Department of Educational Psychology

Assistant Scientist:
Jan T. Jeter

Holland, K. M., Frayer, D. A., Sorenson, J. S., & Ghatala, E. S. Guiding children toward pro-social behavior: A positive approach to student conduct. Practical Paper (Draft-Experimental Copy). September 1970.

Klausmeier, H. J., Schwenn, E. A., & Lamal, P. A. A system of individually guided motivation. Practical Paper No. 9. 28 pp. January 1970. ED 039 619.

In the system of motivation, the child's entering characteristics are assessed, motivational objectives in the form of desired behaviors are set for each child, a program designed to generate and maintain a desired level of motivation for each child is carried out, and finally the child's motivational progress is assessed. The motivational activities are usually directly tied to the instructional program in various curriculum areas and include large-group, class-sized group, and one-to-one activities.

Quilling, M. R., Fischbach, T., Rendfrey, K., & Frayer, D. A. Individual goal-setting conferences related to subject-matter learning: A report on the field test. Technical Report No. 190. 47 pp. November 1971.

The findings of a preliminary field test of the motivation package, Setting Individual Goals for Learning, are reported. In Phase I of the field test, 58 principals, unit leaders, and teachers showed gains in their knowledge of motivational principles and procedures after participating in a goal-setting inservice training session. To see whether the objectives of the program could be fulfilled in the classroom setting (Phase II), three schools implemented the goal-setting conferences in reading or mathematics. It was found that the teachers were able to implement the procedures described in the motivation package and apply motivational techniques in the conferences. The pupils gained significantly in number of skills attained weekly over the eight-week conference period. Furthermore, with discontinuation of the program, none of the pupils' mean weekly rates of skill attainment regressed to that of the preconference baseline period.

Rendfrey, K., Frayer, D. A., & Quilling, M. R. Individually guided motivation: Setting individual goals for learning. Practical Paper No. 11. 66 pp. January 1971. ED 057 412.

A system of individually guided motivation has been designed which identifies the motivational needs of children and describes programs to meet these needs. One of these programs consists of weekly individual teacher-student conferences to set goals in subject matter areas in which the student's motivational level is low.

This practical paper is designed to explain the goal-setting program to teachers planning to implement it as a motivational technique. The paper describes how to (a) select subject-matter areas for goal-setting conferences; (b) develop goal check lists of behavioral objectives in a child's own vocabulary; (c) identify students whose progress in the selected subject matter area suggests a lack of motivation; (d) schedule goal-setting conferences on a regular basis ten minutes weekly; (e) conduct conferences in which the motivational techniques of focusing attention, goal setting, reinforcement and feedback are implemented; (f) evaluate program implementation and effectiveness.

Sorenson, J. S., Schwenn, E. A., & Klausmeier, H. J. The individual conference—a motivational device for increasing independent reading in the elementary grades. Practical Paper No. 8. 43 pp. October 1969. ED 039 110.

The purpose of this paper is to describe in detail the implementation of individual adult-child conferences to increase independent reading. Implementation procedures evolved from research experience with elementary-school children over a 3-year period. The development of this motivational procedure and others has grown out of an attempt by the Wisconsin Research and Development Center to develop a system of individually guided education.

Stewart, D., Quilling, M. R., & Frayer, D. A. Individual conferences to promote independent reading: A report on the field test. Technical Report No. 185. (In press)

WORKING PAPER

Schwenn, E. A., & Sorenson, J. S. Individual conferences in reading: A planning guide. Working Paper No. 30. 6 pp. October 1969.

This guide is intended for principals, unit leaders, teachers, or others directing the implementation of reading conferences and accompanies Practical Paper No. 8 and a video tape, The individual conference: A motivational device for increasing independent reading in the elementary grades.

TECHNICAL MEMO

Frayer, D. A., & Sorenson, J. S. Quality verification of the inservice education package Individual Conferences to Promote Independent Reading. Technical Memo No. QV-15-71, January 1971.

BOOK

Klausmeier, H. J., Frayer, D. A., & Quilling, M. R. Individually Guided Motivation: Guidelines for Implementation. Madison: Wisconsin Research and Development Center for Cognitive Learning. June 1972, Experimental Copy. 263 pp.

Component D6
Computer Applications for IGE

Component Director:
Sidney L. Belt

This developmental component will be initiated in FY 1973.

Component D7
Models for IGE/MUS-Secondary

Principal Investigator:
Stephen J. Knezevich, Department of Educational Administration

Project Coordinator:
Wayne W. Benson

This developmental component is an extension of former Project 308.

Nelson, R. G. An analysis of the relationship of the multiunit school organizational structure and individually guided education to the learning climate of pupils. Technical Report No. 213. (In press)

WORKING PAPER

Knezevich, S. J. Strategies for educational change: The Wisconsin R & D Center general implementation and staff development models for IGE/MUS-E. Working Paper No. 93. 76 pp. February 1972.

The implementation of the innovative instructional pattern called IGE/MUS-E calls for the development of strategies to stimulate and then to manage change. Human behavior must be modified in educational change. Instructional personnel are called upon to abandon previously acquired behavior patterns in favor of new ones.

R & D Center involvement is important in all phases of educational change models, particularly those related to installation and institutionalization of a new product. Major dimensions of a Wisconsin R & D Center general implementation model with special emphasis on staff development are described herein.

Assistance to professional staff in satisfactorily executing new IGE/MUS-E roles and responsibilities is an aspect of the general staff development model which is related to the general implementation model. This model is applied to three different target populations and operationalized through a set of workshops, a training staff, and special support materials.

Implementation Component

Component II
Product Implementation

Program Coordinator:
William H. Sipes

Klenke, W. H., & Evers, N. A. Individually Guided Education: A Simulation. Practical Paper No. 30. (In press)

Resource File for Implementation of IGE/MUS-E. June, 1972.

Quality Verification
and
Technological Implementation

Quality Verification

Director:
Mary R. Quilling

Associate Scientist:
Conrad G. Katzenmeyer

Assistant Scientist:
Walter D. Hubbard

Technological Implementation

Coordinator:
Sidney L. Belt

Conry, J. J. Validity of the rearrangement exercise as a predictor of essay writing ability. Technical Report No. 23. (Master's thesis) 19 pp. May 1967. ED 016 464.

Variations in scoring the rearrangement exercise, in which the student is required to order a series of events, are investigated empirically. Data from the Paragraph Organization portion of the CEEB English Composition Test were rescored to determine which method yielded scores that correlated best with total essay score.

Goodwin, W. L. The effects on achievement test results of varying conditions of experimental atmosphere, notice of test, test administration, and test scoring. Technical Report No. 2. 44 pp. November 1965. (Out of print) ED 010 202.

Because of the frequent use of tests as the instruments for data collection in classroom experimentation, 64 sixth-grade classrooms representing four achievement strata were tested on a standardized arithmetic test to clarify the complex interaction of variables in the classroom. Of special concern was the effect that "participating in an experiment" has on the teacher as subexperimenter in classroom experimentation.

Harris, M. L., & Harris, C. W. A factor analytic interpretation strategy. Technical Report No. 115. 37 pp. March 1970. ED 044 309.

This paper illustrates the use of a strategy for determining the comparable common factors in a set of data. Both orthogonal and oblique derived solutions were obtained for each of several different initial factor methods. The results were compared across the various solutions and three types of factors were determined: comparable common factors, comparable specific factors, and noncomparable factors.

Houston, T. R., Jr. On the construction of Latin squares counterbalanced for immediate sequential effects. Technical Report No. 25. (Master's thesis) 19 pp. May 1967. ED 013 981.

This paper deals with Latin squares as a control for progressive and adjacency effects in experimental designs. The history of Latin squares is reviewed, and several algorithms for the construction of Latin and Greco-Latin squares are proposed. Results are of particular application to rating studies and to designs requiring the "rotation" of teachers in classroom research.

Klausmeier, H. J., Wardrop, J. L., Quilling, M. R., Romberg, T. A., & Schutz, R. E. With remarks by Leslie D. McLean. Research and development strategies in theory refinement and educational improvement. Theoretical Paper No. 15. 24 pp. November 1968. (Out of print)

Research and development strategies designed for improving classroom instruction and for refining teacher-learning theory and implemented at the Wisconsin Research and Development Center for Cognitive Learning and the Southwest Regional Laboratory are discussed in papers by the directors of each and by members of the R & D Center staff.

Porter, A. C. A chi-square approach to discrimination among occupations, using an interest inventory. Technical Report No. 24. (Master's thesis) 41 pp. May 1967.

In this report, a set of weights, established by the chi-square technique, is empirically compared with the Kuder weighting scheme. Data were scored by both sets of weights, and the percentage of males correctly classified according to occupation for each weighting scheme was determined.

Quilling, M. R., Pizzillo, C. M., Hubbard, W. D., & Fischbach, T. J. Saturday Subway Ride: A report on the initial tryout. Technical Report No. 210. 70 pp. December 1971.

Saturday Subway Ride, a program designed to teach pupils creative thinking techniques and positive attitudes toward creative ideas, is a 92-page workbook in a story-exercise format. Secondary objectives for the product include improving verbal fluency and creative writing. Three classrooms, 61 sixth graders and 34 fifth graders at two Wisconsin schools, used the program for two months. The purpose of this paper is to report the results of this initial field study.

The major findings included information on the usability of the product and student attainment of product objectives. Teacher annotations, on-site visitations and rated pupil workbooks indicated that considerable reworking of the exercises was needed, although the teachers gave satisfactory ratings to the program overall. Ratings of the exercises showed that only some pupils learned adequately the five techniques of creative thinking: Part-Changing, Checkerboard Checklist, Find-Something-Similar, and Brainstorming Methods. Changes from pretest to posttest on the 22-item attitude survey and the verbal fluency tests were both significant and positive. Finally, ratings of short writing samples showed improvement for girls but not for boys from pretest to posttest.

Remstad, R. C. Optimizing the response to a concept attainment task through sequential classroom experimentation. Technical Report No. 85. (Ph.D. dissertation) 137 pp. April 1969. ED 035 956.

This study tested the possibility of using the optimization techniques of the response surface model in maximizing the response to a concept learning task.

Toothaker, L. E. An empirical investigation of the permutation T-test as compared to student's T-test and the Mann-Whitney U-test. Technical Report No. 174. (In press)

WORKING PAPER

Fredrick, W. C. Interviews with European educational researchers: 1965. Working Paper No. 9. 45 pp. December 1967. (Out of print)

Research procedures, specific problems under investigation, and the development of research programs are described as they were discussed with researchers in eight countries visited by the author and Professor C. W. Harris.

TECHNICAL MEMOS

Computer Series

Bavry, J. L. Use of Program FINN from tape. Technical Memo No. C-2-68.

Bavry, J. L. Use of a multivariate statistical program in the analysis of repeated measures experiments. Technical Memo No. C-1-69.

Bavry, J. L. Availability of FINNVER4. Technical Memo No. C-2-69.

Bavry, J. L. Note on performing a 3-mode factor analysis. Technical Memo No. C-3-69.

Bavry, J. L. Note on the use of the FINN Multivariance Program to analyze Latin square and other incomplete designs. Technical Memo No. C-4-69.

Halfman, V. Availability of FINNVER4 on the 1108. Technical Memo No. C-5-69.

Skuldt, K., & Lange, D. N. FLANDERS—A computer program to analyze classroom verbal behavior by the Flander's system of interaction analysis. Technical Memo No. C-6-71.

Measurement Series

Romberg, T. A., & Scott, J. A. The effect of changes in instructions on performance on a "Test of Conservation of Numerousness." Technical Memo No. M-68-1.

Harris, M. L. Some methodological suggestions for construction of an objective measurement instrument. Technical Memo No. M-68-2.

Quilling, M. R., Strike, J. M., & Harris, M. L. The effects of variations in word recognition assistance and instrument format in performance on a test of concept attainment for fourth grade. Technical Memo No. M-69-1.

Gaa, J. P., Quilling, M. R., Klausmeier, H. J., & Sorenson, J. S. The effects on prospective high school teachers of study of a practical paper and a videotape dealing with IGE in the MES. Technical Memo No. M-69-2.

Quality Verification Series

Askov, E. N., & Quilling, M. R. Plan for quality verification of the Adminicle. Technical Memo No. QV-1-70.

Strike, J. M., Quilling, M. R., & Askov, E. N. Plan for quality verification of the Compendium. Technical Memo No. QV-2-70.

Quilling, M. R., & Houtman, S. (Plan for) formative evaluation of the fourth grade creative writing program. Technical Memo No. QV-3-70.

Westley, J. E., & Quilling, M. R. (Plan for) formative evaluation of the sixth grade creativity program. Technical Memo No. QV-4-70.

Frayer, D. A., Sorenson, J. S., & Quilling, M. R. Plan for quality verification of the reading conference package. Technical Memo No. QV-5-70.

Strike, J. M. Quality verification of the Compendium. Technical Memo No. QV-6-70.

Askov, E. N., & Quilling, M. R. Plan for quality verification of WDRSD: Rationale and guidelines. Technical Memo No. QV-7-70.

Strike, J. M., & Quilling, M. R. *Quality verification of the WDRSD: Rationale and guidelines*. Technical Memo No. QV-8-70.

Westley, J. E. *Plan for the evaluation of the 2nd edition of the PIA Grade 3 Teacher's Manual*. Technical Memo No. QV-9-70.

Quilling, M. R. *The first field test of the Word Attack element of the WDRSD*. Technical Memo No. QV-10-70. (See Section D3)

Quilling, M. R. *Quality verification of the Adminicle*. Technical Memo No. QV-11-70.

Pizzillo, C., & Quilling, M. R. *Plan for the field test of the Creative Writing Program: Write? Right!* Technical Memo No. QV-13-70.

Quilling, M. R. *Pilot of Motivation Package II: Individual Goalsetting Conferences Related to Subject Matter Learning*. Technical Memo No. QV-14-70.

Frayer, D. A., & Sorenson, J. S. *Quality verification of the inservice education package Individual Conferences to Promote Independent Reading*. Technical Memo No. QV-15-71. (See Section D5)

Stewart, D. M., & Quilling, M. R. *Field test of Individual Conferences to Promote Independent Reading*. Technical Memo No. QV-16-71.

Quilling, M. R. *Field test plan: The WDRSD: Word Attack element*. Technical Memo No. QV-17-71.

Westley, J. E., Fischbach, T. J., & Pizzillo, C. *Formative evaluation of the creative writing program: Write? Right!* Technical Memo No. QV-18-71.

Quilling, M. R. *Addendum to field test plan: The WDRSD: Word Attack element*. Technical Memo No. QV-19-71.

Askov, E. N. *Quality verification of the Guidelines for Self-Directed, Interpretive, and Creative Reading Skills, Working Paper No. 42*. Technical Memo No. QV-20-71.

Quilling, M. R. *Field test plan: The WDRSD: Study Skills element*. Technical Memo No. QV-21-71.

Hubbard, D. *Field test plan: Developing Mathematical Processes*. Technical Memo No. QV-22-71.

Hubbard, D. *Field test plan: Group Conferences to Promote Prosocial Behavior*. Technical Memo No. QV-23-71.

Statistics Series

Fletcher, H. J. *Possible difficulties in interpreting statistical analyses using group means as the experimental unit*. Technical Memo No. S-1-68.

Romberg, T. A. *Guidelines for status studies*. Technical Memo No. S-2-68.

Quilling, M. R. *Caveat to MANOVA users*. Technical Memo No. S-3-68.

Romberg, T. A. *Criteria for evaluating educational research*. Technical Memo No. S-1-69.

Fischbach, T. J., & Walberg, H. J. *Weighted and unweighted means for estimation: A note on the Humphreys-Dachler & Jensen papers*. Technical Memo No. S-1-70.

Levin, J. R. *Note on mixed lists in the analysis of repeated measurements*. Technical Memo No. S-2-70.

Fischbach, T. J. *Statistical procedures for evaluation of the Compendium*. Technical Memo No. S-1-72.

Individually Guided Education

Sorenson, J. S., & Quilling, M. R. *IGE: A simulation*. Technical Memo No. I-1-71.

Testing Series

Fischbach, T. J., Harris, M. L., & Quilling, M. R. *Interim evaluation of Wisconsin Tests of Reading Skill Development*. Technical Memo No. T-1-70. (See Section D3)

Completed Projects

Project 101—Phase 2
Within- and Among-Sentence Variables

Davidson, R. E., & Dollinger, D. E. The effects of deep structure variations in sentences: Free recall and paired-associate learning. Technical Report No. 110. 14 pp. December 1969. ED 039 617.

Three experiments examined the "psychological reality" of deep structure variations for sentences of a language. Analysis of a variety of dependent variables from a variety of experimental paradigms with two different populations suggested that deep structure variations produce differential effects in learning and recall. Two experiments with university students and a third with second-grade children as Ss were performed.

WORKING PAPERS

Davidson, R. E. A research program in the semantic components of concept learning. Working Paper No. 25. 20 pp. October 1969.

Two representative experiments are reported which indicate that the research strategy is a viable one. For example, it was demonstrated that children's learning can be greatly facilitated by the use of rational (prepositional) phrases. Learning score distributions between facilitated and nonfacilitated children showed almost no overlap.

Davidson, R. E. Educational implications of research on elaboration, imagery, and memory: Discussion. Working Paper No. 62. 20 pp. November 1970.

This discussion urges but suggests caution in applying basic research to applied education. The research programs of the participants in an AERA symposium are reviewed, educational implications of the programs are stated, and a crucial issue in education is raised which is related to the research programs. Finally, as a response to that crucial issue, a research program at the Wisconsin Research and Development Center for Cognitive Learning is outlined.

Davidson, R. E., & Adams, J. F. Verbal and imagery processes in children's paired-associate learning. Working Paper No. 63. 16 pp. December 1970.

Experimental operations that typify studies in syntactic mediation were used in a study of 64 second-grade children split into four independent groups. Syntactic and imagery mediators were imposed on the learners. Both kinds of mediators were shown to facilitate the learning of noun pairs but a minimal language cue (prepositional connective) was more effective than imagery. The results offer support for the hypothesis that verbalization is the preferred symbolic process in young children. In particular, a recognition procedure ruled out a response availability hypothesis which has been held to account for the superiority of syntactic mediators.

Davidson, R. E., Ghatala, E. S., & Adams, J. F. Sentence characteristics and transfer in the facilitation of learning: First experiments. Working Paper No. 52. 30 pp. November 1970.

Two experiments in a series on the effects of sentence characteristics in transfer are reported. The first experiment applied the method of syntactical mediation in a traditional negative transfer paradigm, A-B, A-C. The syntactical mediators were applied on the second list. The results showed that sentence contexts for the paired-associate items facilitate second list learning. An overall comparison of paradigms indicated significant negative transfer in the A-C condition.

While there was a tendency toward less negative transfer in the sentence condition than in a conjunction phase and no-context condition, the interaction only approached statistical significance.

The second experiment also used the A-B, A-C negative transfer paradigm, but sentence contexts were applied in first and second list learning. In addition, a specific transfer paradigm was manipulated. It was an A-B, A^S-C paradigm where the items of A-B, A-C were embedded in sentences that changed the meaning of the stimulus terms. The results showed that negative transfer is significantly reduced when items are placed in sentences. Also, the specific effects associated with A-B, A^S-C showed marked negative transfer on the first trial of List 2 learning.

Project 101—Phase 5
Active Manipulation and Perceptual-Cognitive Processes

Wolff, P. Same- and mixed-modality presentation in continuous recognition memory. Technical Report No. 156. 9 pp. March 1971. ED 050 423.

Words were presented either visually (V) or through auditory methods (A) in a continuous recognition memory task. Each word occurred twice, with equal numbers of item pairs in each of the four possible modality combinations (A-A, V-V, A-V, and V-A). The first and second occurrences of a word were separated by 12, 24, 48, or 96 intervening items. Two lists, common and rare nouns, were used. Averaging data from the two lists, a greater number of misses occurred on mixed-modality than same-modality pairs at the first three intervals. At the 96-item interval mixed-modality was superior to same-modality presentation for the rare list only. The results are discussed in terms of Underwood's (1969) multi-attribute theory of memory.

Wolff, P. Mirror-image confusability in adults. Technical Report No. 203. 9 pp. January 1972.

Several studies have indicated that children have difficulty differentiating mirror-image stimuli. In the present study adults were required to classify pairs of horseshoe stimuli as same or different. Response times were compared for stimulus pairs that varied in orientation (left-right vs. up-down) and spatial plane of the pair (horizontal vs. vertical). Stimulus pairs in which the orientation matched the spatial plane of the pair (i.e., horizontal and left-right or vertical and up-down) took longer to classify than stimulus pairs in which these two variables were crossed. These results are interpreted as reflecting the necessity of synthesizing two sources of information in order to compare the former pair types—temporally encoded visual information and directional information from the motor scanning process. Implications for the source of children's difficulty with mirror-image stimuli of this type are discussed.

Project 102—Phase 1
Computer Simulation and Theory

Principal Investigator:
Frank B. Baker, Professor of Educational Psychology

Baker, F. B. The development of a computer model of the concept attainment process: A preliminary report. Occasional Paper No. 5. 61 pp. October 1966. (Out of print) ED 013 978.

This paper describes the development of an IPL-V computer model to obtain a better understanding of the psychological processes underlying human concept attainment. The model has been based upon theoretical grounds, "think aloud" protocols, and speculations as to the nature of concept attainment.

Baker, F. B. The development of a computer model of the concept attainment process: A final report. Theoretical Paper No. 16. 112 pp. November 1968.

Through the development of a computer model of the concept attainment process the Computer Simulation Project has obtained a better understanding of the psychological processes underlying human concept attainment. The model suggests that the majority of the information processed by human subjects is internally created; hence new techniques are needed to elicit this information.

Project 103

Task and Training Variables in Human Problem Solving and Creative Thinking

Principal Investigator:
Gary A. Davis, Professor of Educational Psychology

Davis, G. A. The current status of research and theory in human problem solving. Occasional Paper No. 2. 23 pp. June 1966. (Out of print) ED 010 506.

Problem-solving theories in three areas are summarized: traditional learning, cognitive-Gestalt approaches, and more recent computer and mathematical models of problem solving. Recent empirical studies are categorized according to the type of behavior elicited by the task: overt or covert trial-and-error behavior. The review extends from January 1960 to June 1965.

Davis, G. A., Houtman, S. E., Warren, T. F., & Roweton, W. E. A program for training creative thinking: I. Preliminary field test. Technical Report No. 104. 19 pp. November 1969. (Out of print) ED 036 019.

A three-part model conceptualizing the components of "creativity" as (1) appropriate creative attitudes, (2) various cognitive abilities, and (3) idea-generating techniques suggests a structured approach for improving creative thinking.

Davis, G. A., Houtman, S. E., Warren, T. F., Roweton, W. E., Mari, S., & Belcher, T. L. A program for training creative thinking: Inner city evaluation. Technical Report No. 224. (In press)

Davis, G. A., Manske, M. E., & Train, A. J. Training creative thinking. Occasional Paper No. 6. 18 pp. January 1967. (Out of print)

Method and orientations for stimulating creative thinking in the fields of industry, education, and psychology are reviewed. The review extends from January 1958 to July 1966.

Davis, G. A., Roweton, W. E., Train, A. J., Warren, T. F., & Houtman, S. E. Laboratory studies of creative thinking techniques: The checklist and morphological synthesis methods. Technical Report No. 94. 24 pp. September 1969. ED 036 957.

The main purpose of six experiments was to demonstrate that the use of idea checklists, a standard and intuitively appealing creative thinking technique, will increase idea quality and quantity. College students were allowed 10 minutes, 20 minutes, or (in one experiment) unlimited time to find ideas for "product improvement" problems.

Davis, G. A., Train, A. J., & Manske, M. E. Trial and error vs. "insightful" problem solving: Effects of distraction, additional response alternatives, and longer response chains. Technical Report No. 26. 10 pp. May 1967. ED 013 982.

This report is an extension of Davis's earlier investigations of important pretraining variables which critically influence performance in human problem solving. The task used is a switch-light problem in which the subject attempts to achieve a particular pattern of lights in a matrix by manipulating switches on a response panel.

Freiheit, S. G. The effects of a training program upon the creative performance of fourth grade children. Technical Report No. 79. (Master's thesis) 114 pp. February 1969. ED 036 045.

Two groups of fourth-grade pupils, one experimental and one control, totaling 45 subjects, provided the population of the study. Both groups were pretested and posttested with the Torrance Tests of Creative Thinking.

Roweton, W. E. Creativity: A review of theory and research. Theoretical Paper No. 24. 28 pp. May 1970. ED 044 012.

Creative behavior is a rapidly expanding interest area. In the present review, various theoretical interpretations or "explanations" of creative thinking are classified into five major categories: (1) definitional approaches, (2) dispositional or personality-based theories, (3) psychoanalytic viewpoints, (4) behavioristic theories, and (5) operational approaches.

Warren, T. F. Creative thinking techniques: Four methods of stimulating original ideas in sixth-grade students. Technical Report No. 169. (Ph.D. dissertation) 195 pp. September 1971.

This dissertation reviews the literature on creative behavior and reports the results of a study in which the operational approach to creativity was explored. Each of 119 sixth-grade students was assigned randomly to one of six treatment levels. The Ss in four levels read booklets which described principles of creative thinking techniques, along with presenting examples and exercises. One group read a control booklet, while another read no booklet. Following this, all Ss completed three creativity tests and an attitude inventory. Hypotheses predicted differences among treatment levels as a function of the playfulness or organizational emphasis of the various techniques. The more playful techniques, e.g., Personal Analogy, were expected to produce higher scores on measures of Flexibility, Originality, and Best Ideas. The more organized techniques, e.g., Part Changing, were expected to produce higher scores on Fluency. Results did not support these hypotheses.

Project 105
Rule Learning

Principal Investigator:
H. J. Fletcher, Associate Professor of Psychology

Fletcher, H. J. Toward a general model for describing cognitive processes. Theoretical Paper No. 23. 17 pp. December 1969. (Out of print) ED 043 087.

The first part of this paper briefly describes two studies concerned with cognitive processes in children. One study examined the ability of kindergarten and first-grade children to apply a simple rule of logical inference in order to solve a two-object discrimination problem.

The practical usefulness of this theoretical model for educational research was demonstrated by describing a successful elementary school mathematics project which stressed the analysis of mathematical statements into statements of underlying cognitive operations or processes.

Fletcher, H. J., & Garske, J. P. Logical inference in discrimination learning of young children. Technical Report No. 50. 9 pp. April 1968. (Out of print) ED 036 314.

This study reports on children's learning of cognitive rules. The processes of classification and logical inference in 76 four- to seven-year-old children were investigated with the finding that some of these children did demonstrate inferential reasoning. Used successfully, the task in this study provides a basis for further research on the development of logical reasoning in young children.

Grogg, T. M. A developmental study of sign-differentiated and non-sign-differentiated conditional discrimination learning. Technical Report No. 55. 17 pp. May 1968. (Out of print) ED 024 103.

The ability to make relational discriminations, i.e., to solve problems by responding to the relationships between cues rather than to the absolute properties of individual cues is examined. The laboratory analogy of this type of problem is referred to as a conditional discrimination problem. The difference between a sign-differentiated (SD) and a non-sign-differentiated (NSD) conditional discrimination problem is empirically demonstrated, the former not necessarily requiring a relational rule for solution but the latter necessarily involving true relational learning. Next, by testing sixth graders, tenth graders, and college sophomores, data are provided concerning the developing ability to solve such problems. The results indicated that at each grade level the NSD problem was more difficult than the SD problem. Also revealed was a monotonic developmental trend in conditional problem-solving ability. The results were interpreted in terms of (1) a hierarchy of response tendencies and (2) a differential cognitive requirement.

Kemmerer, J. T., Sawin, D. B., & Freiheit, G. Inference in discrimination learning of early elementary school children. Technical Report No. 74. 11 pp. February 1969.

Sixteen kindergarten and 28 first-grade children were tested on two-choice object discrimination problems. A prompt light indicated the positive (reward) object P on all training trials, and these were followed by a single nonprompted test trial during which a new object (X) replaced either P (X+N problems) or N (P+X problems) or neither (P+N control problems). Two additional control problems assessed verbal responses to the P and N objects alone. All Ss followed the prompt (i.e., displaced only P) and therefore never directly observed the nonreward value of N on prompted trials. However, performance was significantly above chance on nonprompted X+N trials. Control conditions and verbal reports permitted the conclusion that the negative (nonrewarded) value of N had been inferred while responding to P on prompted trials.

Replicating previous findings that preschool and first-grade children were able to achieve a significant degree of inferential learning about a non-responded-to object on a two-choice object discrimination task, the present results further suggest that stimulus novelty is not an important factor in cue-substitution procedures.

Project 106
Motivated Learning

Principal Investigator:
Arthur Staats, Professor of Educational Psychology

Minke, K. A., Jr. *The grammatical form class of verbs and the operant conditioning of word classes*. Technical Report No. 84. (Ph.D. dissertation) 105 pp. June 1969. ED 037 446.

An analysis of part-of-speech membership was made utilizing certain mechanisms that have been proposed to explain the nature of word classes. One implication of the model was that sentences may be regarded as sequences of grammatical habit families.

Minke, K. A. *The early development of verbal mediation in children: An inter-paradigm comparison*. Theoretical Paper No. 21. 14 pp. July 1969. ED 036 864.

It is suggested that because of the tendency of psychologists to characterize behavioral phenomena in distinctive ways, it is frequently difficult to determine if the same labels are being used to refer to the same phenomena by different investigators. One strategy to overcome this problem is to determine if similar conclusions are reached when the same dependent variable is manipulated by various investigators operating under different paradigms.

Staats, A. W. *Emotions and images in language: A learning analysis of their acquisition and function.* Occasional Paper No. 1. 18 pp. June 1966. (Out of print) ED 010 213.

It is suggested that a learning theory that integrates instrumental and classical conditioning, cutting across theoretical lines, can serve as the basis for a comprehensive theory of language acquisition and function. In this paper, Staats illustrates the possibilities of such an integrated learning approach.

Staats, A. W. *Replication of the "Motivated Learning" cognitive training procedures with culturally deprived preschoolers*. Technical Report No. 59. 17 pp. August 1968. (Out of print) ED 029 708.

This research is concerned with training children to count and write. A reinforcer system, used to maintain the children's attention and participation over a long period of time, is based upon tokens which are backed up by material reinforcers. Subjects were 12 four-year-old culturally deprived children.

Staats, A. W., Minke, K. A., & Butts, P. *A token-reinforcement remedial reading program administered by instructional technicians*. Technical Report No. 127. 23 pp. May 1970. ED 042 301.

Reading materials in a stimulus-response presentation procedure combined with a token-reinforcement motivational system were employed with 32 ghetto children in a remedial program. The program was administered by subprofessional instructional technicians supervised by a teacher trained in the experimental methods. The children, who were problem learners, attended well, worked hard, and learned well in the 4- to 5-month program.

The results showed the procedures and reinforcement system to be effective in producing improved attention and work behaviors in the children.

Staats, A. W., Minke, K. A., Goodwin, W. L., & Landeen, J. *"Motivated Learning" reading treatment with additional subjects and instructional technicians*. Technical Report No. 22. 15 pp. March 1967. ED 015 110.

This report describes the successful extension of learning principles to complex human behavior, namely, reading behaviors of highly retarded readers. The instructional program and procedures developed by Staats were administered to junior high school students by persons untrained in teaching.

Van Mondfrans, A. P. Learning principles and procedures applied to remedial reading with normal and educable mentally retarded fourth-, fifth-, and sixth-grade children. Technical Report No. 62. 26 pp. September 1968.

The present study was designed to further validate the Staats procedures and to demonstrate their generality by extending their application to a population of pre- and early-adolescent retarded readers.

WORKING PAPER

Staats, A. W., Van Mondfrans, A. P., & Minke, K. A. Manual of administration and recording methods for the Staats "Motivated Learning" reading procedure. Working Paper No. 6. 26 pp. April 1967. (Out of print) ED 015 107.

The application of an integrated-functional approach to learning in the area of reading is described. The method, which involves a system of extrinsic reinforcement employing tokens, was devised for the treatment of retarded readers, particularly those who are difficult to teach in the normal classroom situation. The procedures, explicit and simple to administer, are applied on a one-to-one basis by nonprofessional personnel.

Project 108
Media and Concept Learning

Principal Investigator:
Bruce H. Westley, Professor of Journalism

Severin, W. Cue summation in multiple-channel communication. Technical Report No. 37. 12 pp. January 1968. ED 021 463.

The performance of seventh-grade pupils on a simple word-recognition task is observed in order to determine the relative effectiveness of providing auditory or visual cues or both combined to be either redundant or inferfering cues. The results increase our knowledge of the conditions under which multiple-channel communication provides the maximum amount of information transmission.

WORKING PAPER

Hsia, H. J. An information theory approach to communications and learning. Working Paper No. 13. 26 pp. April 1969. (Out of print)

The merits and deficiencies of information theory in communication and learning research are examined in this report. The conclusion reached is that information theory may be one of the best instruments for the development of a general, systematic communication-and-learning theory.

Project 109
Rehabilitation of Disadvantaged Youth in Respect to Basic Educational and Social Skills

Principal Investigator:
Robert E. Grinder, Professor of Educational Psychology

Askov, W. H. Cognitive style and social responsibility: An empirical study of an instrument for assessing high school students' sense of responsibility. Technical Report No. 90. (Master's thesis) 138 pp. July 1969. ED 035 958.

The purpose of this study was to explore whether differences exist between competent and incompetent high school students in their styles of thinking and in their attitudes toward what they consider to constitute socially responsible behavior. (The term "social responsibility" was defined, for the purpose of this study, as the ability to anticipate the consequences of one's own behavior.) Apart from ability, scholastic drop-outs and underachievers share many characteristics that distinguish them from their more persistent classmates.

Project 110
Motivation and Concept Learning

Principal Investigator:
Thomas J. Johnson, Assistant Professor of Educational Psychology

Baldwin, T. L., & Johnson, T. J. Teacher behaviors and effectiveness of reinforcement. Technical Report No. 9. 22 pp. 1966. ED 010 511.

The effects of variations in two aspects of teacher behavior—punitiveness and expertise—are reported. The methodology developed for this experiment might be used to assess the varied effects of a number of teacher behaviors.

Project 111
Structure of Concept Attainment Abilities

Principal Investigators:
- Robert Davidson, Associate Professor of Educational Psychology
- Herbert J. Klausmeier, V.A.C. Henmon Professor of Educational Psychology
- Thomas A. Romberg, Associate Professor of Curriculum and Instruction
- B. Robert Tabachnick, Professor of Curriculum and Instruction and Educational Policy Studies
- Alan Voelker, Assistant Professor of Curriculum and Instruction
- Lester S. Golub, Lecturer, English and Curriculum and Instruction

Margaret Harris, Research Associate, Project Manager

Mary R. Quilling, Quality Verification Program Director

Robinson, P. E. Two fifth grade measures of cognitive abilities. Technical Report No. 135. (Master's thesis) 94 pp. June 1970. ED 043 086.

Two fifth grade measures of the ability to deal with symbolic relationships were developed for use in further factor analytic research concerning the nature of intelligence. Circle reasoning was adapted from an adult-level test by modifying the number of symbols and the nature of the principles on which the items were based.

Item analysis results suggested that the four major categories of relationships formed a continuum of difficulty according to the complexity of symbolic relations. Evidence of a learning set effect provided questions for future research.

Project 201—Phase 1

Individually Guided Elementary Mathematics
Patterns in Arithmetic

Principal Investigators:
Henry Van Engen, Emeritus Professor of Mathematics and Curriculum and Instruction
Thomas A. Romberg, Associate Professor of Curriculum and Instruction

Project 201 has been phased into Research Component R2: Conditions of School Learning and Instructional Strategies.

Boe, B. L. Secondary school pupils' perception of the plane sections of selected solid figures. Technical Report No. 13. (Ph.D. dissertation) 33 pp. November 1966. ED 010 515.

Seventy-two subjects representing three ability levels in each of Grades 8, 10, and 12 were individually given two tests, differing only in mode of response, of geometric sections resulting from four cuts hypothetically performed on each of four solid figures. Sex, grade, ability level, and sequence of tasks were used in the analysis of responses to the two tests.

Braswell, J. S. The formative evaluation of Patterns in Arithmetic—Grade 6, using item sampling. Parts I, II, III. Technical Report No. 113. (Ph.D. dissertation) 237 pp. in 3 vols. March 1970. ED 040 877.

The major goal of this study was to determine whether the technique of "item sampling" could be incorporated into a design effective for formative curriculum evaluation. Three sub-goals were (1) to explore the practical relationship between the population and item parameters, (2) to discuss ways formative curriculum evaluation can be used, and (3) to suggest advantages item sampling has over traditional achievement testing.

Braswell, J. S., & Romberg, T. A. Objectives of Patterns in Arithmetic and evaluation of the telecourse for Grades 1 and 3. Technical Report No. 67. 78 pp. January 1969. (Revised edition 1971)

Part One of this report discusses the background and philosophy of the Patterns in Arithmetic (PIA) TV program. Part Two presents the results of a summative noncomparative evaluation done on PIA Grades 1 and 3 during the 1966-67 school year.

Harper, E. H., & Steffe, L. P. The effects of selected experiences on the ability of kindergarten and first-grade children to conserve numerousness. Technical Report No. 38. 45 pp. February 1968. (Out of print) ED 021 752.

This study tests the effects of a sequence of twelve lessons on the ability of kindergarten and first-grade children to recognize and conserve numerousness. Two pretests were administered to each grade level.

LeBlanc, J. F. The performances of first grade children in four levels of conservation of numerousness and three I. Q. groups when solving arithmetic subtraction problems. Technical Report No. 171. (Ph.D. dissertation) 189 pp. November 1971.

This study concerns the performances of first grade children in solving problems involving subtraction situations and the relationship of these performances to levels of conservation of numerousness and to I.Q. groups. The children were categorized into levels of conservation by a pretest administered prior to the main test of problem solving in subtraction. The children were also divided into I.Q. groups so that an analysis of the relationships among all three factors could be made; that is, among the problem solving test, the levels of conservation of numerousness, and the I.Q. groups. Further, the effects of aids and transformations on the performances of the children in the problem solving test were examined.

The pretest of conservation of numerousness was found to be a better predictor of success in problem solving than the group I.Q. test. Further, there was an indication that children in the low levels of conservation of numerousness and the low I.Q. group were more dependent on aids and transformations in solving subtraction problems. The relationship between the results of the problem solving test and the number facts test is such that it is clear that knowledge of number facts is not sufficient for children's success in problem solving.

Leffin, W. W. A study of three concepts of probability possessed by children in the fourth, fifth, sixth, and seventh grades. Technical Report No. 170. (Ph.D. dissertation) 264 pp. September 1971.

This study examined the status of three concepts, basic to fundamental notions of probability, possessed by 528 children in grades four through seven. The three concepts included in this investigation were: points of a finite sample space, probability of a simple event in a finite sample space, and quantification of probabilities. Three tests, one for each of the three concepts, were constructed by the writer for use in this study. Each test consisted of a set of items for which the child's responses would indicate if he could apply the concept in a variety of simple experiment and game situations.

A multivariate analysis of covariance was performed on the results of the three tests. Grade equivalent scores on the three parts of the Stanford Arithmetic Achievement Test were used as covariates. The overall mean performances, adjusted for the covariates, were significantly different ($p < .01$) among I.Q. groups, sex groups and grades. There were no significant interactions.

The most significant outcome of this study is that the children demonstrated that they had acquired considerable knowledge about the three concepts of probability under investigation and could apply these concepts in a variety of situations. These children had not received formal training on the notion of probability, so their understanding and ability to apply these concepts must have developed as a result of their background, experience and intuition. Since young children acquire some knowledge of probability outside of school, it seems reasonable to assume that some topics of probability would not be too difficult to include in the elementary school program.

Marshall, J. L., & Fischbach, T. J. Evaluation of Patterns in Arithmetic in Grades 1-4, 1970-71: Effects on teachers. Technical Report No. 225. 99 pp. March 1972.

A large-scale, summative, comparative evaluation of Patterns in Arithmetic, a modern televised arithmetic curriculum for Grades 1-6, was carried out in Grades 1-4 in both rural and urban schools during the 1970-71 school year. This report deals with the ways in which PIA affects teachers: in basic mathematical knowledge, knowledge of PIA-specific content, and attitudes toward teaching arithmetic. Findings indicate that PIA can be used effectively as inservice education, particularly for those teachers with relatively lower initial knowledge of the basic mathematics which underlies a contemporary elementary school mathematics program. PIA does not seem to change teachers' attitudes, however; nor is it beneficial in increasing knowledge of concepts not specifically related to PIA.

These results seem to hold equally for both rural and urban schools.

Steffe, L. P. The performance of first grade children in four levels of conservation of numerousness and three IQ groups when solving arithmetic addition problems. Technical Report No. 14. (Ph.D. dissertation) 57 pp. December 1966. (Out of print) ED 016 535.

By using a test of conservation of numerousness he developed, the author was able to separate first grade children in each of three IQ groups into four levels of conservation of numerousness. Variables of a described transformation versus no described transformation of sets and of no aids, pictorial aids, and physical aids in addition problems were studied, and a test of addition facts was also conducted. Correlations indicated that excellent predictions of relative success in solving addition problems and learning addition facts can be made for children entering first grade.

Steffe, L. P. The effects of two variables on the problem-solving abilities of first-grade children. Technical Report No. 21. 17 pp. March 1967. (Out of print) ED 019 113.

In the reported research, first-grade children using three different arithmetic programs were individually tested on addition problems. Half of the problems each child received had different names for the sets to be combined and for the total set; half of the children received problems preceded by a quantifier.

Steffe, L. P., & Parr, R. B. The development of the concepts of ratio and fraction in the fourth, fifth, and sixth years of elementary schools. Technical Report No. 49. 43 pp. March 1968. (Out of print) ED 023 612.

Six tests were constructed, four on a pictorial level and two on a symbolic level, to measure the performance of children in three different ability groups on problems which may be classified as ratios or fractions. The authors suggest a number of steps that may be taken to develop appropriate abilities in children.

Van Engen, H., & Steffe, L. P. First grade children's concept of addition of natural numbers. Technical Report No. 5. 13 pp. February 1966. (Out of print) ED 010 508.

A concern with relationships among variables pertaining to learners and a particular subject matter—arithmetic—prompted the study described in this report. Specifically, relationships of sex and IQ level to the acquisition of the concept of addition and of conservation of numerousness were ascertained.

WORKING PAPERS

Braswell, J. S. Patterns in Arithmetic: Field testing, Grade 2, 1967-68. Working Paper No. 17. 20 pp. May 1969. (Out of print)

This report is of a summative evaluation done on PIA, Grade 2, using pre- and post-standardized achievement tests and a questionnaire. Posttest results for the 30-class study group indicate that they exceeded performance of the norms population at the end of Grade 2.

Braswell, J. S. Formative evaluation of Patterns in Arithmetic, Grade 5, 1967-1968. Working Paper No. 18. 90 pp. June 1969.

This paper presents the results of testing during the developmental year of Patterns in Arithmetic (PIA), Grade 5. Results on the end-of-year tests indicate PIA-5 participants have learned traditional computation skills and important concepts in arithmetic that are commensurate with their stage of development. Moreover, certain non-traditional material, particularly in geometry, was well received and tested out satisfactorily. Computation problems tended to be easier at the end of the year than at the testing period of topic coverage. This shows that skills learned early in the year are not forgotten but reinforced by the structure of the Pupil Exercises. Instruments used in the testing program were constructed by the PIA staff and a few items were borrowed from existing standardized instruments.

Irwin, M., & Walter, J. E. A comprehensive look at Patterns in Arithmetic. Working Paper No. 20. 43 pp. April 1969. (Out of print)

The PIA TV series was born of the realization that few programs or materials existed before 1960 to assist learners or teachers in the use of new concepts, especially at the elementary level.

Project 201—Phase 3
Individually Guided Elementary Mathematics
Prototypic System of Computer-Managed Mathematics Instruction

Principal Investigator:
M. Vere DeVault, Professor of Curriculum and Instruction

Kriewall, T. E. Applications of information theory and acceptance sampling principles to the management of mathematics instruction. Technical Report No. 103. (Ph.D. dissertation) 285 pp. in 2 vols. October 1969. (Out of print) ED 038 306 No. 1. ED 038 307 No. 2.

This publication treats several problems of instructional management encountered in situations which emphasize self-selection and self-pacing principles. Primarily, these problems deal with the efficient utilization of available resources to create an operational, individualized, inquiry-learning environment.

Project 202
A System of Individually Guided Instruction: English Language, Composition, and Literature

Principal Investigators:
Robert C. Pooley, Retired Professor of English
Nathan S. Blount, Professor of English and of Curriculum and Instruction
Lester S. Golub, Lecturer, English and Curriculum and Instruction

Blount, N. S., Fredrick, W. C., & Johnson, S. L. The effect of a study of grammar on the writing of eighth-grade students. Technical Report No. 69. 44 pp. December 1968. ED 036 515.

A test of programmed materials in structural and transformational grammar was administered to eighth graders in two schools. 1,000-word writing samples were obtained from all Ss prior to and after the experiments.

Blount, N. S., Fredrick, W. C., Johnson, S. L. Measures of writing maturity from two 500-word writing samples. Technical Report No. 97. 9 pp. September 1969. ED 036 522.

The purpose of this study was to estimate the reliability of various measures of writing behavior using 500-word samples instead of 1,000 words. The themes of 135 eighth graders were collected over a period of six weeks. Themes written during the first three weeks were compared to those of the second three weeks.

Blount, N. S., Johnson, S. L., & Fredrick, W. C. A comparison of the writing of eighth- and twelfth-grade students. Technical Report No. 78. 30 pp. April 1969. ED 035 652.

In each grade, 16 boys and 16 girls were equally distributed into two ability groups on the basis of standardized IQ test scores. Differences between boys and girls and between high and average levels were not significant on any measure.

Blount, N. S., Klausmeier, H. J., Johnson, S. L., Fredrick, W. C., & Ramsay, J. G. The effectiveness of programmed materials in English syntax and the relationship of selected variables to the learning of concepts. Technical Report No. 17. 52 pp. January 1967. ED 013 256.

The experimentation described in this report was conducted jointly by the English and the concept learning groups in the Center to field test 21 programmed lessons in English syntax and concurrently to extend knowledge of five situational variables related to the efficiency of learning concepts. Pre-eighth graders, stratified by sex and IQ, participated in the study.

Fredrick, W. C., Blount, N. S., & Johnson, S. L. A comparison of verbal statement, symbolic notation, and figural representation of grammar concepts. Technical Report No. 64. 19 pp. October 1968. ED 029 892.

The importance of three modes of representation in presenting a series of grammar concepts was investigated. One mode was entirely verbal. The second was based on a symbolic notation, and the third was based on diagrams. Each mode was tested with 72 eighth-grade subjects of high, medium, and low ability.

Pooley, R. C., & Golub, L. S. Concepts and objectives for learning the structure of English in Grades 7, 8, and 9. Theoretical Paper No. 22. 23 pp. November 1969. (Out of print) ED 038 421.

An outline of concepts for learning the structure of English attempts to set down in logical order the basic concepts involved in the recognition and understanding of the English language. It emphasizes the behavioral and social aspects of language as the foundation for instruction.

WORKING PAPERS

Golub, L. S., Fredrick, W. C., & Johnson, S. L. Development and refinement of measures of linguistic abilities. Working Paper No. 33. 12 pp. March 1970.

The purpose of this working paper is to report the pilot-testing and revision of a paper-and-pencil test of linguistic ability. The test was taken by ten fourth graders and major revisions were made. The revision was designed as an objective measure of the ability to think of, manipulate, and evaluate words and sentences as structural and transformational objects.

Pooley, R. C., & Johnson, S. L. The application of transformational grammar to the teaching of English syntax in Grades 7 and 8 at the Starbuck Junior High School, Racine, Wisconsin. Working Paper No. 11. 24 pp. December 1968. (Out of print)

This study was undertaken because of concern about repetition of instruction of traditional grammar and its failure to supply a system of advanced syntax as it is taught in American schools today. After four years of study engaging hundreds of Wisconsin teachers of all levels from kindergarten to the graduate schools of universities, the curriculum guide Teaching the English Language in Wisconsin was published. It was the result of joint efforts of the R & D Center and the English Curriculum Center for the Department of Public Instruction of Wisconsin.

Project 205
Prototypic Instructional Systems:
The Teaching and Learning of Concepts in Verbal Argument

Principal Investigator:
Ronald R. Allen, Professor of Communication Arts and of Curriculum and Instruction

Allen, R. R. Terminal report from the Concepts in Verbal Argument Project. Theoretical Paper No. 35. 15 pp. December 1971.

This terminal report summarizes nine phases of research and development activity of the Concepts in Verbal Argument Project: survey of the literature of critical thinking, identification of sequences of concepts and cognitive abilities, development of measuring instruments, factor analytic study of measuring instruments, normative study of student critical thinking abilities, development of instructional materials, field test of instructional materials, study of the effect of qualifiers on the acceptability of claims, and preparation of project reports. Special attention is given to the methodology and findings of studies related to test development and validation, establishment of norms for student critical thinking abilities, development and testing of programmed learning materials, and the effect of qualifiers in reason statements on the acceptability of claims.

This report is intended to serve as a final general overview of the project. The reader wishing a comprehensive review of the project will wish to read the 12 other research and development documents produced by project personnel.

Allen, R. R., Feezel, J. D., & Kauffeld, F. J. A taxonomy of concepts and critical abilities related to the evaluation of verbal arguments. Occasional Paper No. 9. 36 pp. August 1967. (Out of print) ED 016 658.

The purpose of this paper is to identify concepts and clusters of concepts which adequately define what knowledge a student must possess if he is to critically evaluate everyday discourse.

Allen, R. R., Feezel, J. D., & Kauffeld, F. J. The Wisconsin Tests of Testimony and Reasoning Assessment (WISTTRA). Practical Paper No. 6. 41 pp. January 1969. (Out of print) ED 036 863.

This paper has two main subdivisions: Evaluation of Testimony and Evaluation of Reasoning. Test keys and time estimates are given in the appendixes.

Allen, R. R., Feezel, J. D., Kauffeld, F. J., & Harris, M. L. The development of the Wisconsin Tests of Testimony and Reasoning Assessment (WISTTRA). Technical Report No. 80. 37 pp. April 1969. (Out of print) ED 036 521.

This paper reports the development of a test battery for measuring student mastery of certain verbal skills basic to critical thinking. The particular data presented were gathered by an administration of the fifth edition of the test battery to over 3,000 junior/senior high students in four Wisconsin school systems.

Allen, R. R., & Rott, R. K. The nature of critical thinking. Theoretical Paper No. 20. 19 pp. May 1969. (Out of print) ED 036 861.

The present paper attempts to sort out direct attempts at defining critical thinking. Such definitions are classified by three differing points of view: critical thinking as evaluation, critical thinking as problem solving, and critical thinking as a pluralistic act.

Feezel, J. D. The effect of verbal qualification of argument reasons upon acceptance of the derived claim. Technical Report No. 167. (Ph.D. dissertation) 126 pp. June 1971.

This is a report on research comparing qualified and unqualified statements to determine how they function in the reasons of arguments to affect receiver acceptance of argument conclusions. Nine qualifiers were studied: "certainly, it is certain, I know, probably, it is likely, I believe, possibly, it is possible, I suspect." The qualifiers were placed on reasons in arguments with three variations in location (on data, on warrant, or both). Subjects were eleventh-grade students.

The major conclusions were as follows. (1) Certainty degree words effected stronger conclusions than the other qualifiers, but unqualified statements are as strong as or stronger than certainty statements. (2) Word forms of qualifiers interact with degree in complex way, with personal thought forms tending to be the stronger. (3) "Probably" has an ambiguous meaning between likely and possible degrees. (4) Content and logic factors influence different results for qualifiers in argument from the words viewed in isolation. (5) Though there is some stability in repeated responses, there are also individual variations and inconsistency of response by many students who tend to be the less intelligent and less able readers.

Harris, M. L. A factor analytic study of the Wisconsin Tests of Testimony and Reasoning Assessment (WISTTRA). Technical Report No. 100. 37 pp. October 1969. (Out of print) ED 038 405.

Subject matter specialists in speech developed a taxonomy of concepts and abilities related to verbal argument as used in ordinary discourse. It was the purpose of this study to use data collected to assess these hypothesized abilities to determine, using factor analytic procedures, the construct validity of the taxonomy.

Rott, R. K., Feezel, J. D., Allen, R. R., & Harris, M. L. Student abilities in the evaluation of verbal argument: A normative study. Technical Report No. 106. 27 pp. November 1969. (Out of print) ED 038 404.

During this study, a battery of seven tests, known collectively as the "Wisconsin Tests of Testimony and Reasoning Assessment" (WISTTRA), was administered to more than 3,000 participating subjects.

SPECIAL REPORT

Allen, R. R., Kauffeld, F. J., & O'Brien, W. R. A semiprogrammed introduction to verbal argument:

- Part I, Argument in perspective. 70 pp. December 1968. (Out of print) Not available from ERIC.
- Part II, Argument through testimony. 108 pp. December 1968. (Out of print) Not available from ERIC.
- Part III, Argument through reasoning I. 228 pp. December 1968. (Out of print) Not available from ERIC.
- Part IV, Argument through reasoning II. 338 pp. December 1968. (Out of print) Not available from ERIC.

Project 206
Concepts in Political Science

Principal Investigator:
Jack Dennis, Professor of Political Science

Dennis, J. With the assistance of I. H. Bromall and M. C. Tropp. A survey and bibliography of contemporary research on political learning and socialization. Occasional Paper No. 8. 23 pp. April 1967. ED 013 979.

The extensive bibliography is introduced with a survey of political socialization research. Ten basic problem dimensions are identified and illustrated with existing empirical hypotheses.

Dennis, J. Terminal report of the political learning project. Theoretical Paper No. 19. 6 pp. April 1969. ED 037 472.

This terminal report summarized the four major activities of the political learning project.

Dennis, J. Political learning in childhood and adolescence: A study of fifth, eighth, and eleventh graders in Milwaukee, Wisconsin. Technical Report No. 98. 91 pp. October 1969. (Out of print) ED 040 117.

The present study utilizes the interview responses of 297 fifth-, eighth-, and eleventh-grade children and 205 of their parents to analyze patterns of political learning before and after adolescence.

Dennis, J., Billingsley, K. R., & Thorson, S. J. A pilot experiment in early childhood political learning. Technical Report No. 63. 30 pp. September 1968. (Out of print) ED 043 368.

This study is a pilot experiment in early childhood learning designed to gain information about whether young children are able to comprehend the basic political concepts as part of an interconnected set of concepts about political phenomena.

Project 301
Project MODELS

Principal Investigators:
Herbert J. Klausmeier, V.A.C. Henmon Professor of Educational Psychology
Richard G. Morrow, Assistant Professor of Educational Administration

Cook, D. M., Wardrop, J. L., Tagatz, G. E., & Quilling, M. Research and development activities in R & I Units of two elementary schools of Janesville, Wisconsin, 1966-67. Technical Report No. 45. 17 pp. March 1968. (Out of print) ED 023 175.

Results of two controlled experiments conducted in the units are reported and evaluated. One study, in which four methods of teaching first graders arithmetic were compared, led to the suggestion that techniques be selected specifically for the concept being taught.

Klausmeier, H. J., Cook, D. M., Goodwin, W. L., Tagatz, G. E., & Pingel, L. Individualizing instruction in language arts through development and research in R & I Units of local schools, 1965-1966. Technical Report No. 19. 25 pp. February 1967. (Out of print) ED 013 255.

R & I (research and instruction) Units, first established in schools in spring 1966, are described as organizations that facilitate research and development on cognitive learning in schools. Eight experiments—one in spelling, two in handwriting, and five in reading—conducted in some of the first units are reported.

Klausmeier, H. J., Goodwin, W. L., Prasch, J., & Goodson, M. R. With an introduction by W. G. Findley. Project MODELS: Maximizing opportunities for development and experimentation in learning in the schools. Occasional Paper No. 3. 29 pp. July 1966. (Out of print) ED 010 214.

Following the introduction relating the need for new approaches in educational research to the R & D Center's program, the authors in turn describe (1) the project's origin and rationale including the concepts of learning specialists and R & I Units in local schools, (2) the sophisticated research possible in the units , (3) contributions of the R & I Units to the solution of local educational problems, and (4) a related investigation of the process of change in the schools.

Klausmeier, H. J., & Quilling, M. (Eds.) Research and development activities in R & I Units of four elementary schools of Madison, Wisconsin, 1966-67. Technical Report No. 48. 24 pp. April 1968. (Out of print) ED 021 696.

Individualization and motivation were the focal points of these projects, with special attention given to language arts.

Klausmeier, H. J., Quilling, M., & Wardrop, J. L. (Eds.) Research and development activities in R & I Units of five elementary schools in Racine, Wisconsin, 1966-67. Technical Report No. 52. 44 pp. April 1968. (Out of print) ED 023 176.

One significant finding of this experiment was that a well-planned language enrichment program for disadvantaged kindergarten children improves their communication skills.

Morrow, R. G., Quilling, M. R., & Fox, F. Student achievement and attitudes in Instruction and Research Units in two elementary schools in Janesville, Wisconsin, 1967-68. Technical Report No. 76. 23 pp. February 1969. (Out of print)

The multiunit organizational plan for elementary schools and its basic element, the Instruction and Research Unit, is concerned with developing an environment in local schools and school systems which facilitates individually guided learning by students, research and development activities, and the inservice development of teachers.

Wardrop, J. L., Cook, D. M., Quilling, M. R., Klausmeier, H. J., Espeseth, D., & Grout, C. Research and development activities in R & I Units of two elementary schools of Manitowoc, Wisconsin, 1966-67. Technical Report No. 35. 8 pp. November 1967. (Out of print) ED 019 796.

In addition to discussing activities of the R & I Units, this report describes controlled experiments conducted in third-grade arithmetic instruction and fourth-grade spelling instruction.

WORKING PAPERS

Cook, D. M., Klausmeier, H. J., Cook, R., & Loose, C. Guidelines for initiating an R & I Unit. Working Paper No. 1. 30 pp. October 1966. (Out of print) ED 010 505.

The first sections of this paper are devoted to a description of the nature, composition, and functions of R & I Units. Roles of the three types of personnel in the unit are clarified. Procedures for initiating units, the conditions essential for effective operation of R & I Units, and the procedures for initiating research projects in operating units are the primary topics.

Graper, N., Olson, E., Glowacki, C., Johns, H., Delamater, T., & Smith, N. The Wilson Manual for implementing individually guided reading, Janesville, Wisconsin. Working Paper No. 29. 71 pp. September 1969. (Out of print)

This working paper is from Project MODELS (Maximizing Opportunities for Development and Experimentation of Learning in the Schools). General objectives of the program are to develop and test organizations that facilitate research and development activities in the schools and to introduce and utilize the results of research and development.

Klausmeier, H. J., Cook, D. M., Tagatz, G. E., & Wardrop, J. L. Project MODELS: A facilitative environment for increasing efficiency of pupil learning and for conducting educational research and development. Working Paper No. 5. 36 pp. May 1967. (Out of print) ED 016 004.

Here is a comprehensive story in words and pictures of the first R & I Units. Features described include: the prototypic building organization, plans for organizing a school into units and developing a prototypic instructional program, other nonresearch types of units, training unit leaders, field testing R & I Unit concepts, and roles and responsibilities of various personnel in R & I Units.

Morrow, R., Sorenson, J., & Glasrud, G. Evaluation procedures for use with the multiunit elementary school personnel. Working Paper No. 21. 48 pp. May 1969. (Out of print)

The multiunit elementary school is intended to provide an environment in which individually guided learning can be developed, to facilitate research which is essential for improving instruction, to bring into the school promising educational innovations, and to facilitate the preservice and inservice education of teachers. This working paper is a "blueprint" for counties initiating plans for such an operation.

Pellegrin, R. J., Slagle, A. T., & Johansen, L. Some organizational characteristics of multiunit schools. Working Paper No. 22. 43 pp. June 1969. (Out of print)

The study of the multiunit school, made by CASEA, is based on intensive case studies of eight schools. Four of these were multiunit schools; the other four were control schools selected by the

Wisconsin R & D Center. This paper is a summary of certain data dealing with the schools that were studied. It also raises questions about the organizational problems that may arise in multiunit schools.

Quilling, M. R., & Sorenson, J. S. Student achievement and attitudes in Instruction and Research Units in Winslow Elementary School in Racine, Wisconsin—a two-year report: 1967-68 and 1968-69. (In press)

Smith, R. J., & Klausmeier, H. J. The development of a facilitative environment for learning and research through R & I Units in the secondary school, 1966-67. Working Paper No. 8. 11 pp. July 1967. ED 017 053.

The nature, purpose, and necessary preparation for introduction of the R & I Unit in the secondary schools is described. Eight Wisconsin schools illustrate the different kinds of patterns within which R & I Units can be effective at the secondary school level. Research and development activities of various units in the subject-matter areas of science, English, mathematics, social studies, and physical education of four school systems are briefly discussed.

Wardrop, J. L., Tagatz, G. E., Klausmeier, H. J., Kennedy, B. J., & Cook, D. M. A plan for field testing R & I Units. Working Paper No. 4. 39 pp. February 1967. (Out of print) ED 016 011.

Alternative designs for the evaluation of the unique instructional organization, the R & I Unit, are discussed. Specific programs of evaluation and the instruments planned for use in four Wisconsin cities are briefly outlined.

Project 302
Models for Effecting Planned Educational Change

Principal Investigators:
Max R. Goodson, Professor of Educational Policy Studies
Burton W. Kreitlow, Professor of Educational Policy Studies and of Agricultural and Extension Education
Warren O. Hagstrom, Professor of Sociology and of Educational Policy Studies

Goodson, M. R., & Hagstrom, W. O. Changing schools: Case studies of change-agent teams in three school systems. Technical Report No. 177. 53 pp. August 1971.

Change within a school system is often inhibited by a lack of systematic planning, inadequate communications, and a lack of coordination of efforts among persons who make up the school system. The paper deals with an approach to school system change—the establishment of a change-agent team to plan for and manage specific changes and to facilitate and perpetuate an innovative climate. It presents case studies of change-agent teams in three Wisconsin school systems.

A model for change-agent team planning and action which includes diagnosing problems, planning strategies, transforming strategies into action, and evaluating results is described. Elements of Human Development Laboratory training given to change-agent team members and others within the school systems are presented. These include descriptions of dialogue groups, focused exercises, and concepts used at the sessions as well as actual training designs. The activities of change-agent teams and their colleagues are related, and an evaluation of the interventions based on systematic data is included. The report concludes with recommendations and suggestions for future efforts.

Goodson, M. R., & Hammes, R. A team designed for school system changing. Theoretical Paper No. 11. 26 pp. February 1968. (Reprint May 1969) (Out of print) ED 023 162.

This paper is based upon the premise that the problems of changing a school system require a systematic approach that coordinates various efforts within the system. A team is expected to plan for and manage specific changes as well as to facilitate an innovative climate in a school system.

Hagstrom, W. O., & Gardner, L. L. H. Characteristics of disruptive high school students. Technical Report No. 96. 24 pp. September 1969. (Out of print) ED 035 961.

This report contrasts the characteristics of high school students with disorderly histories and those without such histories.

Hilfiker, L. R. The relationship of school system innovativeness to selected dimensions of interpersonal behavior in eight school systems. Technical Report No. 70. 67 pp. January 1969. (Out of print) ED 029 808.

The relationship between school system innovativeness and selected dimensions of interpersonal behavior is examined in eight school systems.

Hilfiker, L. R. A profile of innovative school systems. Technical Report No. 172. 69 pp. August 1971.

An earlier report examined the relationship of school system innovativeness to selected dimensions of interpersonal behavior in eight school systems as revealed through data collected in 1967. The major implication of this study suggested that the climate of the schools might be changed to make them more receptive to innovation from within or without the systems.

The study replicates portions of the 1967 study and has two additional objectives: relating findings to organizational models and delineating characteristics of an innovative school system. Replication is presented of the manner in which innovativeness as a dependent variable is related to specified independent variables.

Kreitlow, B. W. Basic explorations in adult re-education. Theoretical Paper No. 25. 9 pp. April 1970. ED 042 991.

In a study designed to generate hypotheses for explorations for research in adult re-education, more attention is given to the discovery of promising leads than to the derivation of conclusive evidence. The phenomena of concept attainment, symbol manipulation, verbal behavior, differential instruction, and awareness levels were studied. Attentional involvement in the concept attainment process was not satisfactorily measured. The symbol manipulation process of literate and illiterate adults varied sufficiently to suggest further testing. The verbal behavior of lower-class rural adult women was distinctly limited when compared with middle-class rural women in the same community. This suggested investigation of differentiated programs of instruction. A design for manipulating the instructional variables was developed for possible use in dealing with variability in the "awareness stage" of learning.

Kreitlow, B. W. Evaluating the influence of change-agent teams on the order of change processes of school systems: A test of the Model for Educational Improvement. Technical Report No. 214. 21 pp. February 1972.

The Model for Educational Improvement is a theoretical construct which combines some well-known elements of the change process in a new configuration. The model was developed as a result of an exploratory investigation within the Planned Change Project; it deals with both external factors and the internal structure of a school system and demonstrates the route through which an innovation moves toward adoption. This part of the investigation deals with school systems using change-agent teams as a vehicle for educational improvement and compares them to other school systems without such teams.

Findings revealed little evidence that the presence of change-agent teams made any difference in perception, emphasis, responsibility, or influence in relation to the improvement process in a school system. Of special concern was the ancillary finding that school staffs have limited knowledge of the process of adoption in their own school system. This was identified as the "level of ignorance" and showed that from 32% to 73% of the staff knew little of the process by which a major innovation was adopted in their own school system.

Kreitlow, B. W., & MacNeil, T. An evaluation of the Model for Educational Improvement as an analytical tool for describing the change process. Theoretical Paper No. 18. 17 pp. March 1969. (Out of print) ED 030 197.

This paper describes the structure of the Model for Educational Improvement. It reports on an informal test of the hypothesis that the model is a valid description of the change process within a school system. Data for this test are provided through tape recordings and occasional observations of meetings of change-agent teams operating in three school systems.

Kreitlow, B. W., & MacNeil, T. A model for educational improvement in extension. Theoretical Paper No. 26. 8 pp. April 1970.

The authors propose that the Model for Educational Improvement is a suitable instrument for describing the change process within the context of university extension systems. Originally designed to describe the flow of the change process in school systems, the model is generalized here to describe the flow of the change process in an extension system. In doing so an assumption is made that Extension is also an open system, with a specific internal structure, where an observable improvement process occurs. The model permits an idea to be traced from the point where it enters the system to where it becomes part of the organization's action program.

Kreitlow, B. W., & MacNeil, T. The school board and a model for educational improvement. Practical Paper No. 10. 78 pp. April 1970. ED 043 971.

The introduction of improvements in school systems requires knowledge of how change takes place. The authors propose the Model for Educational Improvement as an instrument for describing the process of change in school systems. This model is a composite of ideas derived from the findings of researchers in the fields of agriculture and education and from the authors' observations of the change process in five Wisconsin school districts.

Project 303
Longitudinal Study of Education Effectiveness of Reorganized School Districts

Principal Investigator:
Burton W. Kreitlow, Professor of Educational Policy Studies
and of Agricultural and Extension Education

Kreitlow, B. W. Long-term study of educational effectiveness of newly formed centralized school districts in rural areas. Technical Report No. 133. 84 pp. April 1971. ED 048 884.

The prime objective of this study was to determine whether or not newly reorganized rural school districts were more effective than the smaller districts they replaced. Five experimental and five control communities were in the sample.

This investigation was longitudinal in design and examined two groups of subjects from their first year in school until five years after their high school graduation. The longitudinal nature of the investigation made possible the pursuit of two related objectives. The first dealt with a determination of the effectiveness of the 4-H Club program in the ten study communities and the second examined the effectiveness of different means of disseminating the research results to the rural public.

Selected findings related to each of the above objectives are: Reorganized school districts provided more learning opportunities; the students had consistently higher achievement-test scores and completed high school with a 6- and a 13-month advantage in mental maturity for boys and girls, respectively. The reorganized district also leads to a higher matriculation in college after high school. Boys from nonreorganized districts scored higher on measures of social adjustment than those in reorganized districts.

4-H Clubs attracted youths from the higher income and social status families with a higher average intelligence and from families previously involved in the program. 4-H members showed no personal and social adjustment advantages.

Project 304
Preparing Personnel for Differentiated Instructional Roles

Principal Investigators:
Theodore J. Czajkowski, Assistant Professor of Curriculum and Instruction
Donald N. Lange, Assistant Professor of Curriculum and Instruction
B. Robert Tabachnick, Professor of Curriculum and Instruction

Lange, D. N., Czajkowski, T. J., Tabachnick, B. R., & Howey, K. A preliminary report on a program for the lead teacher. Working Paper No. 73. 68 pp. August 1971.

This collection of papers presents the need, competencies, model program, and future orientation for an endaavor to educate teachers in assuming team leadership. In the first paper an argument is made for the concept of differentiating staffs. It is followed by an attempt to identify the basic competencies necessary for a teacher to possess in leading a team of teachers which has been organized in a differentiated pattern.

In papers three and four the authors present a basic lead teacher preparation program and the implications such a program may have in a continuously changing school, community, and society.

Project 601
Adult Re-Education

Principal Investigator:
Burton W. Kreitlow, Professor of Educational Policy Studies
and of Agricultural and Extension Education

Boyd, R. D. The psychological and myth-making phenomena in visual symbolization of adult illiterates. Technical Report No. 93. 19 pp. August 1969. ED 034 962.

This pilot study was a limited exploratory investigation which examined certain aspects of visual symbolization ability of matched pairs of literate and illiterate adults.

Kreitlow, B. W. Educating the adult educator: Part 2. Taxonomy of needed research. Theoretical Paper No. 13. 20 pp. May 1968. (Out of print) ED 023 031.

This theoretical paper is the concluding part of an extensive examination of the problem of educating adult educators. The first part deals with the relationship of adult education to other disciplines. This part establishes a framework for classifying areas of needed research in the field of adult education.

Project 701
Culturally Disadvantaged

Principal Investigator:
Julian C. Stanley, Professor of Educational Psychology

Biaggio, A. M. B. Relative predictability of freshman grade-point averages from SAT scores in Negro and white Southern colleges. Technical Report No. 7. (Master's thesis) 31 pp. 1966. ED 010 509.

A comparison of the accuracy of prediction of freshman grades in Negro and non-Negro colleges, via SAT-verbal and SAT-mathematical scores, is described in this report. Correlations between predictors and freshman grade-point averages were compared through a three-factor analysis of variance singly-nested design.

CURRICULUM MATERIALS

This section represents curriculum materials being developed and field tested by the Center. Listings begin with the fall of 1971. The materials are under developmental or commercial copyrights and are not available to the public. For further information about these curriculum programs, write: Curriculum Information, Wisconsin Research and Development Center for Cognitive Learning, University of Wisconsin, Madison, Wisconsin 53706.

D1
Developing Mathematical Processes

Level 1 Teacher's Guide.

This is the manual for kindergarten teachers to assist them in planning and carrying out instructions for the 1971-72 small scale field test of the DMP mathematics program.

Level 1 Worksheets, Parts 1 and 2.

Pupil materials to accompany the Level 1 Teacher's Guide for the 1971-72 small scale field test of the DMP mathematics program.

Level 1 Assessment Manual.

Manual for kindergarten teachers to assist them in planning and carrying out assessment of level of mastery in Level 1.

Level 1 Assessment Materials.

Pupil response assessment materials for Level 1.

Level 2 Teacher's Guide.

Manual for Grade 1 teachers to assist them in planning and carrying out instructions for the 1971-72 small scale field test of the DMP mathematics program.

Level 2 Worksheets.

Pupil materials to accompany the Level 2 Teacher's Guide for the 1971-72 small scale field test of the DMP mathematics program.

Level 2 Assessment Materials.

Pupil response assessment materials for Level 2.

Level 3 Teacher's Guide.

Manual for Grade 1 and Grade 2 teachers to assist them in planning and carrying out instructions for the 1971-72 small scale field test of the DMP mathematics program.

Level 3 Worksheets.

Pupil materials to accompany the Level 3 Teacher's Guide for the 1971-72 small scale field test of the DMP mathematics program.

Level 3 Assessment Materials.

Pupil response assessment materials for Level 3.

Level 1 Teacher's Guide.

Manual for kindergarten teachers to assist them in planning and carrying out instructions for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 1 Assessment Manual.

Manual for kindergarten teachers to assist them in planning and carrying out assessment of level of mastery in Level 1.

Level 1 Printed Materials Package.

Non-consumable pupil materials to accompany the Level 1 Teacher's Guide for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 1 Pupil Workbook (in parts).

Consumable pupil materials to accompany the Level 1 Teacher's Guide for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 2 Teacher's Guide.

Manual for Grade 1 teachers to assist them in planning and carrying out instructions for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 2 Assessment Manual.

Manual for Grade 1 teachers to assist them in planning and carrying out assessment of level of mastery in Level 2.

Level 2 Pupil Test Booklet.

Pupil response assessment materials for Level 2.

Level 2 Printed Materials Package.

Non-consumable pupil materials to accompany the Level 2 Teacher's Guide for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 2 Pupil Workbook.

Consumable pupil materials to accompany the Level 2 Teacher's Guide for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 3 Teacher's Guide.

Manual for Grade 1 and Grade 2 teachers to assist them in planning and carrying out instructions for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 3 Assessment Manual.

Manual for Grade 1 and Grade 2 teachers to assist them in planning and carrying out assessment of level of mastery in Level 3.

Level 3 Pupil Test Booklet.

Pupil response assessment materials for Level 3.

Level 3 Printed Materials Package.

Non-consumable pupil materials to accompany the Level 3 Teacher's Guide for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 3 Pupil Workbook.

Consumable pupil materials to accompany the Level 3 Teacher's Guide for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 4 Teacher's Guide.

Manual for Grade 2 teachers to assist them in planning and carrying out instructions for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 4 Assessment Manual.

Manual for Grade 2 teachers to assist them in planning and carrying out assessment of level of mastery in Level 4.

Level 4 Pupil Test Booklet.

Pupil response assessment materials for Level 4.

Level 4 Printed Materials Package.

Non-consumable pupil materials to accompany the Level 4 Teacher's Guide for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

Level 4 Pupil Workbook.

Consumable pupil materials to accompany the Level 4 Teacher's Guide for the 1972-73 field test of the DMP mathematics program—printed and distributed by Rand McNally & Company.

D2

Elementary Science: Man and the Environment

Man from M.A.N.

Man from M.A.N. is the initial version of the first environmental reader tried out in the spring of 1971.

Pre- and Posttests for Reader 1.

This practical paper includes the assessment and evaluation instruments used in the tryout of Man from M.A.N.

Benjie Loses a Friend.

Benjie Loses a Friend is the tryout version of the second environmental reader tried out in the fall of 1971.

Pre- and Posttests for Reader 2.

This practical paper includes the assessment and evaluation instruments used in the tryout of Benjie Loses a Friend.

Cattails or Concrete?

Cattails or Concrete? is the revised version of Environmental Reader No. 1 (Man from M.A.N.) piloted in the spring of 1972.

Pre- and Posttests.

This practical paper includes the assessment and evaluation instruments used in the tryout of Cattails or Concrete? (revised assessment and evaluation instruments).

Activity Packet.

The Activity Packet is a battery of activities designed to accompany Cattails or Concrete? which was piloted in the spring of 1972.

D3
Wisconsin Design for Reading Skill Development

Word Attack Tests and Administrator's Manuals. (Developmental Edition)

Word Attack, which consists of a booklet test and manual for each of four levels, was printed in 1970 for use in field testing the Word Attack element from 1970-1972.

Teacher's Planning Guide: Word Attack. (Developmental Edition)

Developed in 1970, this paper provides information about implementation of Word Attack skills for classroom teachers and the Word Attack behavioral objectives.

Study Skills: Maps, Graphs, and Tables Tests and Administrator's Manuals. (Developmental Edition)

The maps, graphs, and tables skills tests, which assess skill development at seven levels of difficulty, were developed for use in the field test of these skills which began in December, 1971.

Teacher's Planning Guide: Study Skills. (Developmental Edition)

Printed in 1971, this provides information about the nature of the Study Skills area and about implementation procedures for classroom teachers. The Study Skills behavioral objectives are printed in the Guide.

Rationale and Guidelines. (Developmental Edition)

Developed in 1970, the Rationale and Guidelines is the complete resource about the Design for teacher trainers who conduct local inservice programs. It contains the Outline of Reading Skills and behavioral objectives for all areas.

Word Attack Tests and Administrator's Manuals. (Commercial Edition)

The Word Attack tests and manuals, revised on the basis of field test results, are available commercially in the fall of 1972.

Teacher's Planning Guide: Word Attack. (Commercial Edition)

The Teacher's Planning Guide: Word Attack was revised on the basis of feedback from the Word Attack field test and is available commercially in the fall of 1972. The revised behavioral objectives for Word Attack are included.

Study Skills: Reference Tests and Administrator's Manuals. (Developmental Edition)

The reference skills tests, which assess skill development at seven levels of difficulty, were developed for use in the field test of reference skills which begins in the fall of 1972.

Rationale and Guidelines. (Commercial Edition)

The Rationale and Guidelines was revised on the basis of feedback from the Word Attack field test and is available commercially in the fall of 1972. It contains revisions of the behavioral objectives for all areas.

D4
Prereading Skills Program

Wisconsin Basic Prereading Skill Tests, Form A.

The 1971-72 version contains five subtests. It was pilot tested in 1971-72.

Wisconsin Basic Prereading Skill Tests, Form B.

The 1971-72 version contains five subtests. It was pilot tested in 1971-72.

Wisconsin Basic Prereading Skill Tests, Administrator's Manual.

This manual was pilot tested in 1971-72.

Teacher's Handbook.

1971-72 Prereading Skills Program teacher materials. Small-scale field test of materials in 1971-72.

Teacher's Resource File.

1971-72 Prereading Skills Program teacher materials. Small-scale field test of materials in 1971-72.

Visual Schedule.

1971-72 Prereading Skills Program teacher materials. Small-scale field test of materials in 1971-72.

Sound Schedule.

1971-72 Prereading Skills Program teacher materials. Small-scale field test of materials in 1971-72.

The Prereading Skills Program. (Booklet, September 1971)

1971-72 Prereading Skills Program teacher materials. Small-scale field test of materials in 1971-72.

The Prereading Skills Program: An Overview Booklet for Primary Teachers. (May 1972)

1971-72 Prereading Skills Program teacher materials. Small-scale field test of materials in 1971-72.

Inservice Manual.

In preparation for 1972-73 small-scale field test of inservice program.

Prereading Skills Test, Administrator's Manual.

In preparation for 1972-73 small-scale field test of inservice program.

Teacher's Handbook.

In preparation for 1972-73 small-scale field test of inservice program.

Teacher's Resource File.

In preparation for 1972-73 small-scale field test of inservice program.

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